SHAPES AND SYMMETRY (KEY)

FACES, EDGE AND CORNERS (KEY)

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. A triangular prism has 6 vertices.

Explanation:

A triangular prism consists of two triangular bases and three rectangular lateral faces.

- Each triangular base has 3 vertices, so the two bases together contribute (3 + 3 = 6) vertices.

- The prism does not add any additional vertices beyond those on the bases.

Thus, the correct answer is B) 6.

2. A cylinder has 2 edges.

Explanation:

A cylinder consists of two circular bases and a curved surface connecting them. The edges of a cylinder are defined by the two circular bases:

- Each base contributes one edge, so there are a total of 2 edges.

Thus, the correct answer is C) 2.

3. The shape that has both square and triangular faces is a D) Pyramid.

Explanation:

- A pyramid can have a square base and triangular faces that connect the vertices of the base to a single apex (top point). This configuration makes it a pyramid with both square and triangular faces.

In contrast:

- A cylinder has circular bases and a curved surface.
- A cube has only square faces.

- A sphere has no faces.

Thus, the correct answer is D) Pyramid.

4. The shape that has no edges or vertices is a C) Sphere.

Explanation:

- A sphere is a perfectly round three-dimensional shape with no edges or vertices; every point on its surface is equidistant from its center.

In contrast:

- A cylinder has edges (the circular edges) and vertices (the top and bottom circles).

- A cube has edges and vertices.

- A pyramid has edges and vertices as well.

Thus, the correct answer is C) Sphere.

ADVANCED LEVEL

More than One Answer Type

5. The shapes with edges and corners are:

C) Cube, D) Rectangular Prism, E) Pyramid

Explanation:

- Cube: Has 12 edges and 8 vertices (corners).

- Rectangular Prism: Has 12 edges and 8 vertices as well.

- Pyramid: Has edges (depending on the base shape) and vertices (corners at the base and the apex).

In contrast:

- Sphere: Has no edges or corners.
- Cylinder: Has edges (the circular edges) but no vertices.

So, the correct options are C, D, and E.

6. The solid shape that has at least one curved surface is:

C) Sphere

Explanation:

- Sphere: Completely curved surface with no edges or vertices. The other shapes listed do not have any curved surfaces:

- A) Cube: All flat surfaces.

- B) Rectangular Prism: All flat surfaces.

- D) Triangular Prism: Flat triangular and rectangular faces.

- E) Pyramid: Flat triangular and square faces.

Thus, the only correct answer is C) Sphere.

7. The shapes that have vertices are:

C) Cube, E) Rectangular Prism, D) Triangular Prism Explanation:

- Cube: Has 8 vertices.

- Rectangular Prism: Also has 8 vertices.

- Triangular Prism: Has 6 vertices (3 from each triangular base). The other shapes do not have any vertices:

- A) Cylinder: Has no vertices, only circular edges.

- B) Sphere: Has no vertices, only a smooth curved surface.

Thus, the correct answers are C, E, and D.

8. The shapes that have only one type of face are:

A) Cube, C) Sphere

Explanation:

- Cube: All faces are squares (one type of face).

- Sphere: Has a single continuous curved surface (one type of face). The other shapes have more than one type of face:

- B) Cylinder: Has circular faces and a curved surface.

- D) Triangular Prism: Has triangular faces and rectangular faces.

Thus, the correct answers are A) Cube and C) Sphere.

9. The shape that has both rectangular and triangular faces is:

E) Pyramid

Explanation:

- Pyramid: A pyramid can have a rectangular base with triangular faces leading up to an apex.

The other shapes do not have both types of faces:

- A) Cube: All faces are square.
- B) Cylinder: Has circular faces and a curved surface.
- C) Sphere: Has a smooth curved surface with no faces.

- D) Triangular Prism: Has triangular and rectangular faces, but does not fit the criteria of having both types when considering a single solid. Thus, the correct answer is E) Pyramid.

Fill In the Blanks

10. Cylinder

11. Sphere

Answer the Following Questions

12.

1. Flat Faces: These are flat surfaces that can be shaped like squares, rectangles, triangles, or other polygons. For example:

- A cube has square faces.

- A rectangular prism has rectangular faces.

2. Curved Faces: These surfaces are not flat and have a smooth, rounded shape. For example:

- A cylinder has two circular faces (top and bottom) and one curved face around the side.

- A sphere has one curved surface all around.

3. Mixed Faces: Some shapes have a combination of flat and curved faces. For example:

- A cone has one circular face (the base) and one curved face (the side).

Summary

- Flat Faces: Square, rectangle, triangle, etc.

- Curved Faces: Circular, smooth surfaces like those on cylinders and spheres.

- Mixed Faces: A combination of flat and curved surfaces, like in cones and pyramids.

13. Some solid shapes have more than one type of face, corners (vertices), and edges. Here are a few examples:

1. Pyramid

- Faces: Has a base (which can be a triangle or square) and triangular faces that connect the base to the apex.

- Corners (Vertices): The number of corners equals the number of base corners plus one at the apex. For example, a square pyramid has 5 vertices.

- Edges: The edges are the line segments where the faces meet. A square pyramid has 8 edges.

2. Triangular Prism

- Faces: Has two triangular faces and three rectangular faces.

- Corners (Vertices): It has 6 vertices (3 from each triangular face).

- Edges: It has 9 edges (3 edges from each triangular face and 3 connecting the triangles).

3. Cuboid (Rectangular Prism)

- Faces: Has 6 rectangular faces.

- Corners (Vertices): It has 8 vertices.

- Edges: It has 12 edges.

4. Cone

- Faces: Has one circular face (the base) and one curved surface.

- Corners (Vertices): It has one vertex (the tip).

- Edges: It has one circular edge (the edge of the base).

Summary

These solid shapes show how different types of faces can come together, along with their corners and edges, making them unique in geometry.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. The faces of a triangular prism are:

A) Triangles and B) Rectangles.

Explanation:

- A triangular prism has two triangular faces (the bases) and three rectangular faces (the lateral sides).

So the correct options are A) Triangles and B) Rectangles.

2. A cylinder has C) 2 circular faces.

Explanation:

- A cylinder has two circular bases (one at the top and one at the bottom) and one curved surface connecting them.

Thus, the correct answer is C) 2.

3. A cube has B) 6 faces.

Explanation:

- A cube is made up of 6 square faces, one on each side.

Thus, the correct answer is B) 6.

4. The shape that has no edges or vertices is a C) Sphere.

Explanation:

- A sphere is completely round with a smooth surface, having no edges or corners.

The other shapes have edges and vertices:

- A) Cylinder: Has circular edges and two circular faces.

- B) Cube: Has edges and vertices (corners).

- D) Pyramid: Has edges and vertices as well.

Thus, the correct answer is C) Sphere.

ADVANCED LEVEL

More than One Answer Type

5. The shapes that have rectangular or square faces are:

A) Cube, B) Rectangular Prism, E) Pyramid

Explanation:

- Cube: All 6 faces are squares.

- Rectangular Prism: Has 6 faces, which can include rectangles and squares.

- Pyramid: A square pyramid has a square base and triangular faces, while other types of pyramids can have rectangular bases.

The other shapes do not have rectangular or square faces:

- C) Triangular Prism: Has triangular and rectangular faces, but not exclusively rectangular or square.

- D) Cylinder: Has circular faces and a curved surface.

Thus, the correct answers are A) Cube, B) Rectangular Prism, E) Pyramid.

6. The shapes that have triangular faces are:

C) Triangular Prism, E) Pyramid.

Explanation:

- Triangular Prism: Has two triangular faces and three rectangular faces.

- Pyramid: A pyramid can have a triangular base with triangular faces connecting the base to the apex (for example, a triangular pyramid).

The other shapes do not have triangular faces:

- A) Cube: Has only square faces.
- B) Cylinder: Has circular faces and a curved surface.
- D) Sphere: Has a smooth curved surface with no faces.

Thus, the correct answers are C) Triangular Prism and E) Pyramid.

7. The shapes that have circular faces are:

- B) Sphere
- D) Cylinder

Explanation:

- Sphere: While it doesn't have distinct faces, it is a completely round shape that can be considered to have a continuous circular surface.

- Cylinder: Has two circular faces (top and bottom) and one curved surface.

The other shapes do not have circular faces:

- A) Cube: Has square faces.
- C) Rectangular Prism: Has rectangular faces.
- E) Triangular Prism: Has triangular and rectangular faces.

Thus, the correct answers are B) Sphere and D) Cylinder.

8. The shapes that have more than one type of face are:

B) Cylinder, D) Triangular Prism

Explanation:

- Cylinder: Has two circular faces (top and bottom) and one curved surface.

- Triangular Prism: Has two triangular faces and three rectangular faces.

The other shapes have only one type of face:

- A) Cube: All faces are squares.
- C) Rectangular Prism: All faces are rectangles.
- E) Sphere: Has a continuous curved surface.

Thus, the correct answers are B) Cylinder and D) Triangular Prism.

Fill In the Blanks

9. A pyramid has both rectangular and triangular faces.

Explanation: A pyramid can have a rectangular base with triangular faces that connect the vertices of the base to a single apex. For example, a rectangular pyramid has a rectangular base and four triangular faces.

10. A cube has six faces, all of which are squares.

Explanation: In a cube, each of the six faces is a square, making it a regular polyhedron with equal edge lengths and identical square faces.

Answer the Following Questions

11. Shapes with rectangular or square faces that have edges and corners include:

1. Cube

- Faces: A cube has 6 square faces.

- Edges: It has 12 edges where the faces meet.

- Corners (Vertices): A cube has 8 corners (vertices) where the edges meet.

2. Rectangular Prism

- Faces: A rectangular prism has 6 rectangular faces (which can include squares if the dimensions are equal).

- Edges: It has 12 edges.

- Corners (Vertices): A rectangular prism has 8 corners.

3. Pyramid (with a rectangular base)

- Faces: A rectangular pyramid has 1 rectangular base and 4 triangular faces.

- Edges: It has 8 edges (4 from the base and 4 connecting to the apex).

- Corners (Vertices): It has 5 corners (4 at the base and 1 at the apex).

Explanation of Edges and Corners:

- Edges: These are the line segments where two faces meet. For example, in a cube, each edge connects two vertices and is the boundary between two square faces.

- Corners (Vertices): These are the points where three or more edges meet. In a cube, for instance, each corner is where three square faces come together.

Summary

These shapes are characterized by having defined flat surfaces (rectangles or squares), and they have well-defined edges and corners, making them easy to identify and analyze in geometry.

12. Shapes with triangular faces that have edges and corners include:

1. Triangular Prism

- Faces: A triangular prism has 2 triangular faces and 3 rectangular

faces.

- Edges: It has 9 edges—3 edges on each triangular face and 3 connecting the two triangles.

- Corners (Vertices): It has 6 corners (3 from each triangular face).

2. Pyramid (with a triangular base)

- Faces: A triangular pyramid (tetrahedron) has 4 triangular faces.

- Edges: It has 6 edges, with each edge connecting two vertices.

- Corners (Vertices): It has 4 corners (vertices) where the edges meet.

3. Cone

- Faces: While primarily considered to have a circular face, a cone can also be described as having a curved surface and one triangular face (the side that tapers to a point).

- Edges: It has 1 circular edge (the base) and no straight edges.

- Corners (Vertices): It has 1 vertex (the tip).

Explanation of Edges and Corners:

- Edges: These are the line segments where two faces meet. In a triangular prism, for example, the edges connect the vertices of the triangular faces and the vertices of the rectangular faces.

- Corners (Vertices): These are the points where three or more edges meet. In a triangular pyramid, each corner is where the edges of the triangular faces converge.

Summary

These shapes are defined by their triangular faces, which contribute to their overall structure. They also have edges and corners that allow for their identification and classification in geometry.

SYMMETRY (KEY)

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. A butterfly's wings typically exhibit D) Reflection symmetry.

Explanation:

- Reflection symmetry (or bilateral symmetry) means that one side of the butterfly's wings is a mirror image of the other side. If you draw a line down the middle of the butterfly, both halves will look the same.

Thus, the correct answer is D) Reflection symmetry.

2. A rectangle has C) 2 lines of symmetry.

Explanation:

- A rectangle has two lines of symmetry: one that runs vertically down the middle and another that runs horizontally across the middle. Each line divides the rectangle into two equal halves.

Thus, the correct answer is C) 2.

3. The shape that has the most lines of symmetry is a B) Circle.

Explanation:

- Circle: A circle has an infinite number of lines of symmetry because any line that passes through the center is a line of symmetry.

- Square: A square has 4 lines of symmetry.

- Triangle: An equilateral triangle has 3 lines of symmetry.

- Pentagon: A regular pentagon has 5 lines of symmetry.

Thus, the correct answer is B) Circle.

4. An isosceles triangle has B) 1 line of symmetry.

Explanation:

- The line of symmetry in an isosceles triangle runs vertically down the middle, dividing it into two equal halves. The two equal sides reflect across this line, while the base does not.

Thus, the correct answer is B) 1.

5. The shape that has both rotational and line symmetry is:

C) Circle

Explanation:

- Circle: A circle has an infinite number of lines of symmetry (any line through the center is a line of symmetry) and also has rotational symmetry (it looks the same at any rotation).

- Square: Has both line symmetry and rotational symmetry (specifically 4 rotations).

- Rectangle: Has line symmetry and rotational symmetry (180 degrees).

- Triangle: Some triangles have line symmetry (like an isosceles triangle) and rotational symmetry, but not all triangles do.

While all four shapes can have some form of symmetry, the circle uniquely has both types in abundance.

Thus, the correct answer is C) Circle.

6. A shape with line symmetry can also be called:

A) Reflection symmetry

Explanation:

- Reflection symmetry means that one side of the shape is a mirror image of the other side when divided by a line (the line of symmetry).

Thus, the correct answer is A) Reflection symmetry.

7. A regular hexagon has D) 6 lines of symmetry.

Explanation:

- A regular hexagon has lines of symmetry that can be drawn through each vertex to the opposite side and through the midpoints of opposite sides. This results in a total of 6 lines of symmetry.

Thus, the correct answer is D) 6.

ADVANCED LEVEL

More than One Answer Type

8. The shapes that have more than one line of symmetry are:

A) Square, B) Circle, C) Rectangle, E) Oval.

Explanation:

- Square: Has 4 lines of symmetry (2 diagonals and 2 midlines).

- Circle: Has an infinite number of lines of symmetry (any line through the center).

- Rectangle: Has 2 lines of symmetry (one vertical and one horizontal).

- Oval: Typically has 2 lines of symmetry (one vertical and one horizontal), depending on its proportions.

D) Triangle can have more than one line of symmetry, but it depends on the type of triangle:

- An equilateral triangle has 3 lines of symmetry, while an isosceles triangle has 1.

Thus, the correct answers are A) Square, B) Circle, C) Rectangle, and E) Oval.

9. The shapes that have rotational symmetry of 180 degrees are:

A) Square, C) Rectangle, E) Oval.

Explanation:

- Square: Can be rotated 180 degrees and still look the same.

- Rectangle: Also looks the same when rotated 180 degrees.

- Oval: Generally has 180-degree rotational symmetry, depending on its proportions.

B) Circle: Has infinite rotational symmetry (not specifically 180 degrees).

D) Triangle: Only certain types (like an equilateral triangle) can have specific rotational symmetries, but generally, a triangle does not have 180-degree rotational symmetry.

Thus, the correct answers are A) Square, C) Rectangle, and E) Oval.

10. The shapes that have both line and rotational symmetry are:

A) Square, B) Circle, C) Rectangle, E) Oval.

Explanation:

- Square: Has both line symmetry (4 lines) and rotational symmetry (90 degrees).

- Circle: Has infinite lines of symmetry and infinite rotational symmetry.

- Rectangle: Has 2 lines of symmetry and 180-degree rotational symmetry.

- Oval: Typically has 2 lines of symmetry (vertical and horizontal) and can have 180-degree rotational symmetry.

D) Triangle: Depending on the type, it can have line symmetry (like an isosceles triangle) but does not generally have rotational symmetry unless it's an equilateral triangle (which has 3).

Thus, the correct answers are A) Square, B) Circle, C) Rectangle, and E) Oval.

11. The shapes that have at least one line of symmetry are:

A) Square, B) Circle, C) Rectangle, D) Triangle, E) Oval.

Explanation:

- Square: Has 4 lines of symmetry.

- Circle: Has an infinite number of lines of symmetry.

- Rectangle: Has 2 lines of symmetry.

- Triangle: Can have 1 or more lines of symmetry, depending on the type (e.g., isosceles has 1, equilateral has 3).

- Oval: Typically has 2 lines of symmetry (vertical and horizontal).

Thus, all the shapes listed have at least one line of symmetry.

Fill In the Blanks

- 12. Reflection symmetry.
- 13. 3 lines of symmetry.
- 14. Reflection symmetry.
- 15. 4 lines of symmetry.

16. Angle.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

- 1. Symmetry is:
- B) A balanced arrangement of parts.

Explanation: Symmetry refers to the property where one half of a shape or object is a mirror image of the other half, resulting in a balanced and harmonious arrangement.

2. A square has:

A) Rotational symmetry and B) Line symmetry.

Explanation:

- Rotational symmetry: A square can be rotated 90 degrees, 180 degrees, or 270 degrees and still look the same.

- Line symmetry: A square has 4 lines of symmetry (two diagonals and two midlines).

So, the best answer that represents one type would be A) Rotational symmetry, but keep in mind it also has line symmetry.

3. All of the following shapes have rotational symmetry, but to different degrees:

A) Circle: Has infinite rotational symmetry.

B) Rectangle: Has 180-degree rotational symmetry.

C) Triangle: An equilateral triangle has 120-degree rotational symmetry.

D) Pentagon: A regular pentagon has 72-degree rotational symmetry.

So, the answer is that all of them have rotational symmetry, but specifically:

- A) Circle has the most (infinite).

- B) Rectangle, C) Triangle (equilateral), and D) Pentagon all have specific degrees of rotational symmetry.

If you need to choose just one, A) Circle is the most notable for having infinite rotational symmetry.

4. When a shape has line symmetry:

B) It can be divided into two equal halves.

Explanation:

Line symmetry means that if you draw a line (the line of symmetry) through the shape, one side will be a mirror image of the other side, cre-

ating two equal halves.

5. An equilateral triangle has D) 3 lines of symmetry.

Explanation:

Each line of symmetry runs from a vertex to the midpoint of the opposite side, dividing the triangle into two equal halves.

6. The shape that has no lines of symmetry is:

B) Triangle (specifically, an irregular triangle).

Explanation:

- A square, rectangle, and circle all have lines of symmetry:
- Square: 4 lines of symmetry.

- Rectangle: 2 lines of symmetry.

- Circle: Infinite lines of symmetry.

However, while some triangles (like isosceles and equilateral) do have lines of symmetry, an irregular triangle typically does not. So, if considering only irregular triangles, B) Triangle is the correct choice.

ADVANCED LEVEL

More than One Answer Type

7. All of the following shapes can have line symmetry:

A) Circle, B) Square, C) Rectangle, D) Triangle (depending on the type; isosceles and equilateral triangles have line symmetry) E) Pentagon (a regular pentagon has 5 lines of symmetry)

Summary

So, the correct answer is that all of the listed shapes can have line symmetry.

8. All of the following shapes can have rotational symmetry:

A) Square: Has rotational symmetry (90 degrees), B) Circle: Has infinite rotational symmetry, C) Rectangle: Has 180-degree rotational symmetry, D) Triangle: An equilateral triangle has rotational symmetry (120 degrees); isosceles triangles can have some as well, E) Oval: Typically has 180-degree rotational symmetry. Summary

Thus, the correct answer is that all of the listed shapes can have rotational symmetry.

9. The shape that has no lines of symmetry is:

C) Triangle (specifically, an irregular triangle).

Explanation:

- A) Square: Has 4 lines of symmetry.
- B) Circle: Has infinite lines of symmetry.
- D) Rectangle: Has 2 lines of symmetry.
- E) Pentagon: A regular pentagon has 5 lines of symmetry.

While an irregular triangle may have no lines of symmetry, other types of triangles (like isosceles and equilateral) do. If considering only irregular triangles, C) Triangle would be the correct choice for having no lines of symmetry.

Fill In the Blanks

- 10. Infinite
 11. 1 line of symmetry.
- 12. 6 lines of symmetry.
- 13. 2 lines of symmetry.
- 14. Asymmetric.