Understanding Elementary Shapes — 2D and 3D

Unit: Basic Geometry - Student Practice Worksheet

Overview: Kabir held up a piece of paper and called it a shape. Anaya held up a dice and called it a shape too. Ms. Rao said only one of them could ever lie perfectly flat on a table. The difference between those two kinds of 'shape' turned out to matter a lot.

Practice Questions (30 Total)

Section A - Easy

Q1. The teal square sits flat on the page. 2D or 3D?

flat on the page

- [ ] **A.** 3D shape
- [ ] **B.** 2D shape
- [ ] **C.** Neither 2D nor 3D
- [ ] **D.** Both 2D and 3D

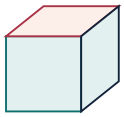
Q2. A flat surface of a 3D shape is called a:

- [ ] **A.** Face
- [ ] **B.** Edge
- [ ] **C.** Vertex
- [ ] **D.** Net

Q3. How many faces does a cube have?

- [ ] **A.** 4
- [ ] **B.** 12
- [ ] **C.** 8
- [ ] **D.** 6

Q4. The dice sketch has height. 2D or 3D?



dice has height

- [ ] **A.** 2D shape
- [ ] **B.** 3D shape
- [ ] **C.** Neither 2D nor 3D
- [ ] **D.** A flat shape

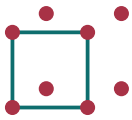
Q5. The line where two faces meet is called a:

- [ ] **A.** Vertex
- [ ] **B.** Net
- [ ] **C.** Edge
- [ ] **D.** Face

Q6. How many edges does a cube have?

- [ ] **A.** 6
- [ ] **B.** 8
- [ ] **C.** 12
- [ ] **D.** 10

Q7. Eight maroon corners on the cube. How many vertices?



maroon corners

- [ ] **A.** 6
- [ ] **B.** 12
- [ ] **C.** 10
- [ ] **D.** 8

Q8. A corner point where edges meet is called a:

- [ ] **A.** Vertex
- [ ] **B.** Face
- [ ] **C.** Net

- [ ] **D.** Edge

Q9. A flattened-out pattern that folds into a 3D solid is called a:

- [ ] **A.** Face
- [ ] **B.** Net
- [ ] **C.** Vertex
- [ ] **D.** Edge

Q10. Which of sphere, cylinder, triangle, cone is 2D, and why?

- [ ] **A.** Sphere
- [ ] **B.** Cylinder
- [ ] **C.** Triangle
- [ ] **D.** Cone

Section B - Medium

Q11. Cube cards: faces, edges, corners. Which triple is 6, 12, 8?

- [ ] **A.** 6, 12, 8
- [ ] **B.** 8, 12, 6
- [ ] **C.** 6, 8, 12
- [ ] **D.** 4, 6, 8

Q12. Why does a 2D shape have no volume?

- [ ] **A.** Because it is always too small
- [ ] **B.** Because it has too many sides
- [ ] **C.** Because it is always a circle
- [ ] **D.** Because it has no thickness — only length and width

Q13. A rectangular box (cuboid) has how many faces?

- [ ] **A.** 4
- [ ] **B.** 6
- [ ] **C.** 8

- [ ] **D.** 12

Q14. A triangular pyramid: 4 faces, 4 corners. How many edges?

4 faces, 4 corners

- [ ] **A.** 4
- [ ] **B.** 6
- [ ] **C.** 8
- [ ] **D.** 12

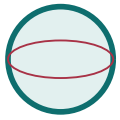
Q15. Why is a cylinder tricky to describe using 'faces, edges, vertices' the same way as a cube?

- [ ] **A.** It has curved surfaces, not just flat faces meeting at straight edges
- [ ] **B.** It has no surfaces at all
- [ ] **C.** It is actually a 2D shape
- [ ] **D.** It has more vertices than a cube

Q16. A cuboid has how many edges?

- [ ] **A.** 6
- [ ] **B.** 8
- [ ] **C.** 12
- [ ] **D.** 10

Q17. A ball with no flat sides. How many flat faces?



no flat faces

- [ ] **A.** 1
- [ ] **B.** 6
- [ ] **C.** 0
- [ ] **D.** 2

Q18. Can more than one valid net exist for the same 3D solid?

- [ ] **A.** No, every solid has exactly one possible net
- [ ] **B.** Only spheres can have multiple nets
- [ ] **C.** Only cubes can have zero nets
- [ ] **D.** Yes, as long as folding recreates the same faces meeting correctly

Q19. Which pair correctly matches a real object to its dimension type?

- [ ] **A.** A drawn circle = 2D; a football = 3D
- [ ] **B.** A drawn circle = 3D; a football = 2D
- [ ] **C.** Both are 2D
- [ ] **D.** Both are 3D

Q20. A cross of six squares folded to a cube. What does that confirm about nets?

- [ ] **A.** The specific arrangement of faces in a net doesn't have to match Ms. Rao's example exactly, as long as folding still works
- [ ] **B.** Only cross-shaped nets ever work for cubes
- [ ] **C.** The cube must have been drawn incorrectly
- [ ] **D.** Nets never actually fold into real solids

Section C - Challenge

Q21. Cube numbers 6, 8, 12 in F+V–E. What does 6+8–12 equal?

$6 + 8 - 12$ cube F, V, E

- [ ] **A.** 6+8–12=2, confirming the formula
- [ ] **B.** 6+8–12=4, formula fails
- [ ] **C.** 6+8–12=0, formula fails
- [ ] **D.** The formula cannot be checked this way

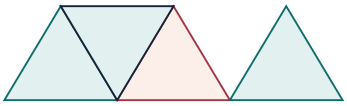
Q22. Kabir claims a cylinder has exactly 2 faces (top and bottom circles) and 0 edges. Is the 'edges' part correct under a strict flat-face definition?

- [ ] **A.** It's debatable, depending on the definition used
- [ ] **B.** Yes, cylinders definitely have zero edges under every definition
- [ ] **C.** No, cylinders have exactly 12 edges like a cube
- [ ] **D.** No, cylinders have no faces at all

Q23. Using Euler's formula (F+V−E=2), a solid has 5 faces and 6 vertices. How many edges must it have?

- [ ] **A.** 9
- [ ] **B.** 11
- [ ] **C.** 13
- [ ] **D.** 7

Q24. The net is made of triangles for a triangular pyramid. How many triangles?



pyramid net

- [ ] **A.** 3
- [ ] **B.** 4
- [ ] **C.** 6
- [ ] **D.** 8

Q25. Why can't a single flat net ever be folded into a sphere, unlike a cube?

- [ ] **A.** Spheres are actually 2D shapes
- [ ] **B.** Spheres have too many vertices
- [ ] **C.** Its surface is continuously curved, unlike flat cube faces
- [ ] **D.** Spheres have no surface at all

Q26. A triangular prism has 2 triangular faces and 3 rectangular faces (5 total), and 9 edges. How many vertices does it have?

- [ ] **A.** 8
- [ ] **B.** 6
- [ ] **C.** 5
- [ ] **D.** 9

Q27. Teal cube and maroon cuboid boxes. Does the face count change?

cube vs cuboid boxes

- [ ] **A.** Yes, a cube always has more faces than a cuboid

- [ ] **B.** Yes, a cube always has fewer faces
- [ ] **C.** Cubes and cuboids cannot be compared this way
- [ ] **D.** No — both a cuboid and a cube have exactly 6 faces, just cubes have all-equal squares

Q28. Why is understanding 2D and 3D shapes useful beyond just naming them?

- [ ] **A.** It has no real practical use beyond naming shapes
- [ ] **B.** Only artists need this distinction
- [ ] **C.** 2D and 3D shapes are identical in every practical sense
- [ ] **D.** Area, volume, packaging and construction all depend on it

Q29. A solid has 8 faces, 12 vertices, and (by Euler's formula) how many edges?

- [ ] **A.** 20
- [ ] **B.** 16
- [ ] **C.** 18
- [ ] **D.** 22

Q30. Not every 3D shape is only flat faces. What manufacturing consequence?

- [ ] **A.** Curved objects need different manufacturing than flat-faced boxes
- [ ] **B.** Curved 3D objects cannot actually be manufactured
- [ ] **C.** It has no practical consequence at all
- [ ] **D.** Curved objects are always more expensive regardless of shape

Answer Key

Q1: (B) (b) 2D shape — flat, length and width only.

Q2: (A) (a) Face.

Q3: (D) (d) 6 faces.

Q4: (B) (b) 3D shape — has length, width and height.

Q5: (C) (c) Edge.

Q6: (C) (c) 12 edges.

Q7: (D) (d) 8 vertices.

Q8: (A) (a) Vertex.

Q9: (B) (b) Net.

Q10: (C) (c) Triangle — flat, no thickness.

Q11: (A) (a) 6 faces, 12 edges, 8 vertices.

Q12: (D) (d) A 2D shape has no thickness, so there's no third dimension to give it volume.

Q13: (B) (b) 6 faces, same as a cube — top, bottom, and four sides.

Q14: (B) (b) 6 edges — each of the 4 triangular faces shares an edge with the others.

Q15: (A) (a) A cylinder's curved surface doesn't fit the flat-face, straight-edge, sharp-vertex description as neatly as a cube.

Q16: (C) (c) 12 edges, same as a cube.

Q17: (C) (c) 0 — a sphere's entire surface is curved, with no flat faces at all.

Q18: (D) (d) Yes — different arrangements of the same faces can fold into the identical solid.

Q19: (A) (a) A drawn circle is flat (2D); a real football is solid and takes up space (3D).

Q20: (A) (a) It confirms multiple different net layouts can all fold into the same correct solid.

Q21: (A) (a) 6+8−12=2 — matches Euler's formula exactly.

Q22: (A) (a) It genuinely depends on the definition used — some treat the circular boundary where the curved surface meets each flat face as an edge, others reserve 'edge' for meetings of two flat faces only.

Q23: (A) (a) 9. 5+6−E=2, so E=9.

Q24: (B) (b) 4 — one flat triangle for each of the pyramid's 4 triangular faces.

Q25: (C) (c) A sphere's continuously curved surface cannot be represented by flat pieces folded together without stretching or distorting — genuinely different from a flat-faced solid like a cube.

Q26: (B) (b) 6. Using Euler's formula: 5+V−9=2, so V=6.

Q27: (D) (d) No — a cube is simply a special cuboid where all faces happen to be equal squares; both have 6 faces.

Q28: (D) (d) Real applications like packaging, construction, and area/volume calculations all depend on correctly distinguishing flat 2D measurements from solid 3D ones.

Q29: (C) (c) 18. 8+12–E=2, so E=18.

Q30: (A) (a) Curved-surface objects (bottles, balls, cylinders) genuinely require different manufacturing and design techniques than flat-faced boxes, since they can't be built from a simple flat-folding net.

You've got this! Keep learning and shining! - Ruchi Math Coaching