

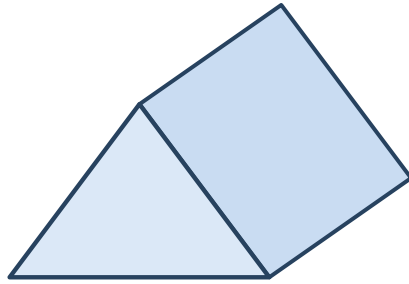
GCSE Maths: Properties of 3D solids (Higher): answers

GCSE Maths - Volume, Surface Area and 3D Shapes - Higher - Lesson 19.1

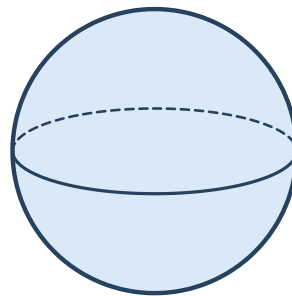
Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch19-volume-surface-area-3d/higher/properties-of-3d-solids/

Exercise 19A Properties of 3D solids Non-calculator

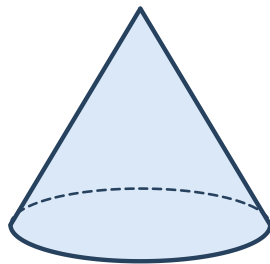
- 1 Write down the name of each solid.



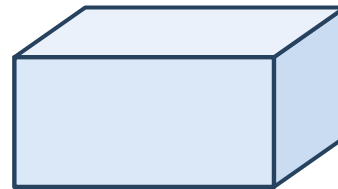
A



B



C



D

- (a) Solid A

Answer: triangular prism

- (b) Solid B

Answer: sphere

- (c) Solid C

Answer: cone

- (d) Solid D

Answer: cuboid

- 2 Write down the number of faces, edges and vertices of each solid.

- (a) a cube

Answer: 6 faces, 12 edges, 8 vertices

(b) a triangular prism

Answer: 5 faces, 9 edges, 6 vertices

(c) a square-based pyramid

Answer: 5 faces, 8 edges, 5 vertices

(d) a hexagonal prism

Answer: 8 faces, 18 edges, 12 vertices

3 For each solid, write down the number of flat faces, curved surfaces, edges and vertices.

(a) a cylinder

Answer: Flat faces 2, curved surfaces 1, edges 2, vertices 0

(b) a cone

Answer: Flat faces 1, curved surfaces 1, edges 1, vertices 1

(c) a sphere

Answer: Flat faces 0, curved surfaces 1, edges 0, vertices 0

4 Name the solid described.

(a) It has 6 square faces.

Answer: cube

(b) It has 2 triangular faces and 3 rectangular faces.

Answer: triangular prism

(c) It has 1 square face and 4 triangular faces.

Answer: square-based pyramid

(d) It has 1 flat circular face, 1 curved surface and 1 vertex.

Answer: cone

5 A cuboid has 12 edges. Four edges are 5 cm long, four are 3 cm long and four are 2 cm long. Work out the total length of all 12 edges.

Answer: 40 cm

6 Work out the number of faces, edges and vertices of each solid.

(a) a pentagonal prism

Answer: 7 faces, 15 edges, 10 vertices

(b) a pentagonal-based pyramid

Answer: 6 faces, 10 edges, 6 vertices

(c) a triangular-based pyramid (tetrahedron)

Answer: 4 faces, 6 edges, 4 vertices

7 Samira makes a model of a square-based pyramid from straws. The straws for the base are each 8 cm long and the four straws that slope up to the top are each 9 cm long. Work out the total length of straw she uses.

Answer: 68 cm

8 Name the solid with each set of numbers.

- (a) 5 faces, 9 edges and 6 vertices

Answer: triangular prism

- (b) 5 faces, 8 edges and 5 vertices

Answer: square-based pyramid

- (c) 4 faces, 6 edges and 4 vertices

Answer: triangular-based pyramid (tetrahedron)

- (d) 7 faces, 15 edges and 10 vertices

Answer: pentagonal prism

9 Use Euler's formula, $V - E + F = 2$, to find the missing number for each solid.

- (a) Hexagonal prism: $F = 8$, $E = 18$. Find V .

Answer: 12

- (b) Hexagonal prism: $V = 12$, $F = 8$. Find E .

Answer: 18

- (c) Square-based pyramid: $V = 5$, $E = 8$. Find F .

Answer: 5

10 A prism has 24 edges. (a) How many sides does the end face have? (b) How many faces does the prism have?

- (a) How many sides does each end have?

Answer: 8

- (b) How many faces does the prism have?

Answer: 10

11 A pyramid has 10 faces. How many edges and how many vertices does it have?

Answer: 18 edges and 10 vertices

12 Ali says, "A cone has 2 faces, 1 edge and 1 vertex." Is Ali correct? Explain.

Answer: Yes, if the curved surface is counted as a face: 1 flat face + 1 curved surface, 1 edge, 1 vertex.

13 Write "True" or "False" for each statement and give a reason.

- (a) A cube is a type of cuboid.

Answer: True

- (b) A sphere has no edges and no vertices.

Answer: True

- (c) Every prism has a rectangle as its cross-section.

Answer: False

- (d) Every pyramid has an even number of faces.

Answer: False

- 14 A solid has 6 vertices and 10 faces. (a) Use Euler's formula to work out its number of edges. (b) Could the solid be a prism? Give a reason.

- (a) Number of edges

Answer: 14

- (b) Could it be a prism?

Answer: No

- 15 An octahedron has 8 faces, all triangles. Each triangle has 3 edges, and every edge is shared by 2 faces. (a) Work out the number of edges. (b) Use Euler's formula to work out the number of vertices.

- (a) Number of edges

Answer: 12

- (b) Number of vertices

Answer: 6

- 16 A solid has F faces, all of which are triangles, and every edge is shared by exactly two faces. Show that the number of edges is $3F \div 2$, and that F must be even.

Answer: $E = 3F/2$; F is even because E is a whole number