nexamind EDUCATION

Name _____ Date _____

8.4 3D shapes and nets — worked answers

Name 3D shapes, count their faces, edges and vertices, and recognise their nets. · 52 questions

A · Fluency — Count faces, edges and vertices.

1 How many **faces** does a cube have?

Answer: 6

A cube has 6 square faces, so 6 faces.

2 How many **edges** does a cube have?

Answer: 12

A cube has 12 edges.

3 How many **vertices** does a cube have?

Answer: 8

A cube has 8 vertices.

4 How many **faces** does a cuboid have?

Answer: 6

A cuboid has 6 rectangular faces, so 6 faces.

5 How many **edges** does a cuboid have?

Answer: 12

A cuboid has 12 edges.

6 How many **vertices** does a cuboid have?

Answer: 8

A cuboid has 8 vertices.

7 How many **faces** does a triangular prism have?

Answer: 5

A triangular prism has 2 triangles and 3 rectangles, so 5 faces.

8 How many **edges** does a triangular prism have?

Answer: 9

A triangular prism has 9 edges.

9 How many **vertices** does a triangular prism have?

Answer: 6

A triangular prism has 6 vertices.

10 How many **faces** does a square-based pyramid have?

Answer: 5

A square-based pyramid has 1 square and 4 triangles, so 5 faces.

11 How many **edges** does a square-based pyramid have?

Answer: 8

A square-based pyramid has 8 edges.

12 How many **vertices** does a square-based pyramid have?

Answer: 5

A square-based pyramid has 5 vertices.

13 How many **faces** does a tetrahedron have?

Answer: 4

A tetrahedron has 4 triangular faces, so 4 faces.

14 How many **edges** does a tetrahedron have?

Answer: 6

A tetrahedron has 6 edges.

15 How many **vertices** does a tetrahedron have?

Answer: 4

A tetrahedron has 4 vertices.

16 How many **faces** does a pentagonal prism have?

Answer: 7

A pentagonal prism has 2 pentagons and 5 rectangles, so 7 faces.

17 How many **edges** does a pentagonal prism have?

Answer: 15

A pentagonal prism has 15 edges.

18 How many **vertices** does a pentagonal prism have?

Answer: 10

A pentagonal prism has 10 vertices.

19 How many **faces** does a hexagonal prism have?

Answer: 8

A hexagonal prism has 2 hexagons and 6 rectangles, so 8 faces.

20 How many **edges** does a hexagonal prism have?

Answer: 18

A hexagonal prism has 18 edges.

21 How many **vertices** does a hexagonal prism have?

Answer: 12

A hexagonal prism has 12 vertices.

22 How many **faces** does a triangular-based pyramid have?

Answer: 4

A triangular-based pyramid has 4 triangular faces, so 4 faces.

23 How many **edges** does a triangular-based pyramid have?

Answer: 6

A triangular-based pyramid has 6 edges.

24 How many **vertices** does a triangular-based pyramid have?

Answer: 4
A triangular-based pyramid has 4 vertices.

25 For a cube, work out faces + vertices − edges.

Answer: 2
6 + 8 − 12 = 2. Euler's rule says this is 2 for every solid with flat faces and no holes.

26 For a cuboid, work out faces + vertices − edges.

Answer: 2
6 + 8 − 12 = 2. Euler's rule says this is 2 for every solid with flat faces and no holes.

27 For a triangular prism, work out faces + vertices − edges.

Answer: 2
5 + 6 − 9 = 2. Euler's rule says this is 2 for every solid with flat faces and no holes.

28 For a square-based pyramid, work out faces + vertices − edges.

Answer: 2
5 + 5 − 8 = 2. Euler's rule says this is 2 for every solid with flat faces and no holes.

29 For a tetrahedron, work out faces + vertices − edges.

Answer: 2
4 + 4 − 6 = 2. Euler's rule says this is 2 for every solid with flat faces and no holes.

B · Reasoning — Prisms, pyramids and nets.

30 What is a **face** of a solid?

- ☐ A corner
- ☐ A flat surface
- ☐ A straight line
- ☐ The whole solid

Answer: A flat surface
Faces are the flat surfaces you could paint.

31 What is an **edge**?

- ☐ A corner
- ☐ A flat surface
- ☐ A line where two faces meet
- ☐ The base

Answer: A line where two faces meet
Edges are the lines you could trace.

32 What is a **vertex**?

- ☐ A corner where edges meet
- ☐ A flat surface
- ☐ A line
- ☐ A curve

Answer: A corner where edges meet
The plural is vertices.

33 What is a **net**?

- ☐ A drawing of a solid
- ☐ A flat shape that folds up into the solid
- ☐ The base of a solid
- ☐ The volume

Answer: A flat shape that folds up into the solid

Cut a cardboard box along its edges and flatten it: that is a net.

34 What do all prisms have in common?

- ☐ Six faces
- ☐ The same cross-section all the way along
- ☐ Triangular faces
- ☐ A curved surface

Answer: The same cross-section all the way along

Slice a prism anywhere across and you get the same shape every time.

35 What do all pyramids have in common?

- ☐ A square base
- ☐ Faces that meet at a single apex
- ☐ Six edges
- ☐ Two identical ends

Answer: Faces that meet at a single apex

The base can be any polygon; the triangular faces meet at a point.

36 For any solid with flat faces and no holes, faces + vertices − edges equals …

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ it varies

Answer: 2

This is Euler's rule. A cube: 6 + 8 − 12 = 2.

37 Does a cube have more than one possible net?

- ☐ Yes
- ☐ No

Answer: Yes

There are eleven different nets for a cube.

38 A prism has a hexagonal cross-section. How many faces?

- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 12

Answer: 8

Two hexagons plus one rectangle for each of the 6 sides: 2 + 6 = 8.

C · Challenge — Euler's rule, and big polygons.

39 A prism has a 10-sided cross-section. How many faces has it?

Answer: 12

Two decagons plus 10 rectangles: 2 + 10 = 12.

40 A prism has a 10-sided cross-section. How many edges has it?

Answer: 30

10 round each end plus 10 joining them: 10 + 10 + 10 = 30.

41 A pyramid has a hexagonal base. How many faces has it?

Answer: 7

The base plus one triangle per side: 1 + 6 = 7.

42 A pyramid has a hexagonal base. How many vertices has it?

Answer: 7

Six round the base plus the apex: 6 + 1 = 7.

43 A solid has 8 faces and 12 vertices. How many edges, using Euler's rule?

Answer: 18

F + V − E = 2, so 8 + 12 − E = 2 and E = 18.

44 A solid has 20 faces and 30 edges. How many vertices?

Answer: 12

20 + V − 30 = 2, so V = 12.

D · Word problems — Boxes, tents and pyramids.

45 A dice is a cube. How many faces does it have?

Answer: 6

A cube has 6 square faces — hence the six numbers.

46 A cereal box is a cuboid. How many edges does it have?

Answer: 12

Four round the top, four round the bottom, four upright.

47 A tent is a triangular prism. How many faces does it have?

Answer: 5

Two triangular ends and three rectangles.

48 The Great Pyramid has a square base. How many triangular faces does it have?

Answer: 4

One for each side of the square base.

49 A chocolate box is a hexagonal prism. How many vertices does it have?

Answer: 12

Six at each end.

50 A cardboard box is cut open and laid flat. What is that flat shape called? Answer 1 for net, 0 for face.

Answer: 1

A flat shape that folds up into the solid is a net.

51 A pencil is a hexagonal prism. How many rectangular faces does it have?

Answer: 6

One for each side of the hexagon.

52 A paperweight is a square-based pyramid. How many edges does it have?

Answer: 8

Four round the base and four rising to the apex.