Unit 17 · Solid Objects

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 27

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Edges of a cuboid

ANSWER HA · 4

i. **DC, EF and HG**.
ii. **CG, FG and HG**.
iii. **ABCD, DCGH and BCGF**.
iv. **CG, DH, EH and FG**. Edges that touch A or B (AD, AE, BC, BF) meet AB, and DC, EF and HG are parallel to it. These four run in other directions, but never reach AB, however far they go. They are not parallel to AB either: they don't run the same way as AB, so they don't stay the same distance from it all along.

MARKING SCHEME

✓ DC, EF, HG.
✓ CG, FG, HG.
✓ ABCD, DCGH, BCGF.
✓ CG, DH, EH, FG.

2 A box with six sides at each end

ANSWER HA · 4

i. The bottom has 6 corners, each giving 2 vertices: $V = 6 \times 2 = \mathbf{12}$.
ii. Each corner gives 3 edges: $E = 6 \times 3 = \mathbf{18}$.
iii. Each corner gives 1 side face, plus the 2 ends: $F = 6 + 2 = \mathbf{8}$.
iv. $12 - 18 + 8 = \mathbf{2}$, as for every box like this.

MARKING SCHEME

✓ V = 12.
✓ E = 18.
✓ F = 8.
✓ $12 - 18 + 8 = 2$.

3 The painted cube

ANSWER HA · 4

i. 3 layers of 3×3: **27** small cubes.
ii. **8**, one at each **vertex** of the big cube.
iii. **12** with 2 faces, one in the middle of each **edge**. **6** with 1 face, one in the middle of each **face**.
iv. **1**, in the very middle. $8 + 12 + 6 + 1 = 27$ ✓.

MARKING SCHEME

✓ 27.
✓ 8, at the vertices.
✓ 12 at the edges and 6 at the faces.
✓ 1, and the total 27.

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4 Wire skeletons

ANSWER A · 4

i. A cuboid has 4 lengths, 4 breadths and 4 heights: $4 \times (10 + 6 + 5) = 4 \times 21 =$ **84 cm**.
ii. A cube has 12 equal edges: $84 \div 12 =$ **7 cm**.
iii. $48 \div 4 = 12$, so length + breadth + height = 12 cm: for example **5 cm, 4 cm and 3 cm** (or 6, 4, 2; 7, 3, 2; 6, 5, 1; 7, 4, 1; 8, 3, 1; 9, 2, 1).

MARKING SCHEME

- ✓ 84 cm.
- ✓ 7 cm.
- ✓ Length + breadth + height = 12 cm.
- ✓ Three different whole numbers adding up to 12.

5 Wrapping a brick

ANSWER A · 3

i. Opposite faces are equal: **two** faces 20 cm by 10 cm (top and bottom), **two** 20 cm by 5 cm (front and back), **two** 10 cm by 5 cm (the ends).
ii. $20 \times 10 =$ **200 cm²**, $20 \times 5 =$ **100 cm²**, $10 \times 5 =$ **50 cm²**.
iii. $2 \times (200 + 100 + 50) = 2 \times 350 =$ **700 cm²**.

MARKING SCHEME

- ✓ The three pairs of faces.
- ✓ 200, 100 and 50 cm^2.
- ✓ 700 cm^2.

6 Which solid am I?

ANSWER U · 4

i. A **cone**: one circular base and one curved surface; it turns about its vertex.
ii. A **cylinder**: two equal, parallel circles, so both ends go the same distance in one turn.
iii. A **sphere**: only one curved surface.
iv. A **cube**: a cuboid with all 12 edges equal.

MARKING SCHEME

- ✓ Cone.
- ✓ Cylinder.
- ✓ Sphere.
- ✓ Cube.

7 Think: four faces alike

ANSWER HA · 4

i. **Two** lengths: the **8** edges round the two squares are equal, and the **4** edges joining them are equal (like the juice pipes of Activity 4).
ii. All 12 edges are 4 cm: a **cube**.
iii. **Three** lengths (its length, breadth and height), **4** edges of each.
iv. **No.** Opposite faces are equal, so a face and the one opposite it have the same size. If five faces are the same size, the sixth is opposite one of them and is that size too: all six are equal, and every face is a square. It is a cube, with six faces the same.

MARKING SCHEME

- ✓ Two lengths: 8 of one, 4 of another.
- ✓ A cube.
- ✓ Three lengths, 4 edges of each.
- ✓ No: the sixth face is opposite one of the five.

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See it at Science Playground

Exhibits and plants at the center, Bhaktapur, that go with this unit. Book a class visit at science-playground.com/booking.

- **Woods of Nepal** (exhibit): Lift a wood block, a cube, and count its faces, edges and vertices: 6, 12 and 8. Check the rule: $8 - 12 + 6 = 2$.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	4	7	16	**27**