Unit 2 · Solid Objects

HARDER PRACTICE QUESTIONS

Full marks 33

Write your answers on separate paper. Show your working, and give a reason for each answer. Draw a box or a straw model wherever it helps.

1 Two cubes in one model [4]

Nirjala makes hollow models from straws and clay balls. Each straw is one edge, and each clay ball joins the straws at a corner. All her straws are the same length.

i. How many straws and clay balls does she need for one hollow cube?
ii. She makes two separate cubes. How many straws and balls is that?
iii. Instead, she makes the two cubes side by side, sharing the square between them, so they make one long cuboid. How many straws and balls does she need now?
iv. How many straws and balls does sharing save?

2 One piece of wire [3]

Ujwal makes the edges of a hollow cuboid from one long piece of wire, cut into pieces. The cuboid is 12 cm long, 8 cm broad and 4 cm high.

i. How much wire does he use?
ii. With the same length of wire he could make a hollow cube instead. How long would each edge of the cube be?

3 Spot the error [3]

Sana wrote: “A cuboid has 6 faces, and each face has 4 corners. So a cuboid has $6 \times 4 = 24$ vertices.”

What is wrong? Correct her working.

4 The hidden faces of a die [3]

On a die, the dots on opposite faces always add up to 7. A die lies on a table. Gyanu sees **5** on the top, **3** on the front and **1** on the right side.

i. What numbers are on the bottom, the back and the left side?
ii. What is the total of the dots Gyanu can’t see?
iii. Check your answer to ii in another way, using the total of all six faces.

5 Painted and pulled apart [3]

Three equal cubes are joined in a row to make a cuboid. The whole outside of the cuboid is painted red. Then the cubes are pulled apart again.

i. How many faces of the middle cube are red?
ii. How many faces of each end cube are red?
iii. How many of the 18 cube faces are not red?

6 Lines and angles in a box [4]

These questions use Unit 1 too. Think of a cuboid, such as a closed matchbox.

i. What kind of angle is each corner of a face?
ii. How many such angles are there on all the faces of a cuboid together?
iii. Pick one edge. How many of the other edges are parallel to it?
iv. How many edges meet your edge at a right angle?

7 A box from a net [3]

A shop folds a box for a phone from a flat net of card. The box is 15 cm long, 8 cm broad and 2 cm high, and it has a lid.

i. How many rectangles does the net have?
ii. Write the length and breadth of each rectangle. How many are there of each size?
iii. The shop makes a tray of the same size, with no lid. How many faces, edges and vertices does the tray have?

8 Is it possible? [4]

Give a reason for each.

i. A cuboid whose 12 edges all have different lengths.
ii. A cuboid with exactly 4 square faces.
iii. A cube that is not a cuboid.
iv. A solid object with no edge and no vertex.

9 Make your own [3]

Anjila has 12 small equal cubes. She wants to put all of them together into one cuboid, with no gaps.

i. Find **four** different cuboids she can make. For each, say how many cubes long, broad and high it is.
ii. Which of your cuboids have exactly 2 square faces?

10 Think [3]

In Pemba's box, 3 straws meet at every clay ball: 8 balls $\times$ 3 = 24 straw ends, and 12 straws have 12 $\times$ 2 = 24 ends.

i. Mingma makes a different straw model. It has 10 clay balls, and 3 straws meet at every ball. How many straws does it have?
ii. Could a model have 7 clay balls, with 3 straws meeting at every ball? Give a reason.