Worksheet

Thinking out of the Box - A Worksheet

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Monika was teaching 'Nets of Cuboids' with Class 5. During the reflection and discussion after the sessions, the mathematics teacher pointed out two misconceptions that arose during her sessions. The cuboid that she chose included two square faces. Some of the students formed the misconception that the net of a cuboid must have at least one pair of square faces. The worksheet given below is intended to address this misconception.

As per the new Class 3 NCERT textbooks, cubes and cuboids are introduced in Chapter 2 and it is expected that students make different solids by combining several (identical) cubes. Edges and corners are also introduced. Squares and rectangles are introduced in Chapter 5. In Chapter 1 of the Class 4 textbook, nets of various solids including cubes and cuboids are discussed, and children learn that the net of a polyhedron is made of its faces. Using triangular dot paper, they draw sketches of cubes and cuboids. In Chapter 2, they understand perspective view. Therefore, this worksheet can be used in Class 4 or in Class 5.

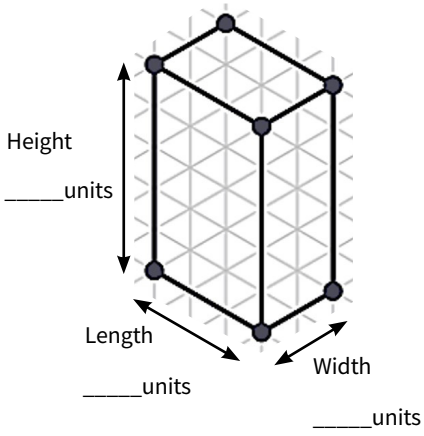
Keywords: cuboids, cubes, faces, edges, nets, dimensions

Worksheet

Name: _____

1. Use the grid to find the dimensions of the cuboids given below:

(a)



a. This cuboid is

_____ units by _____ units by _____ units

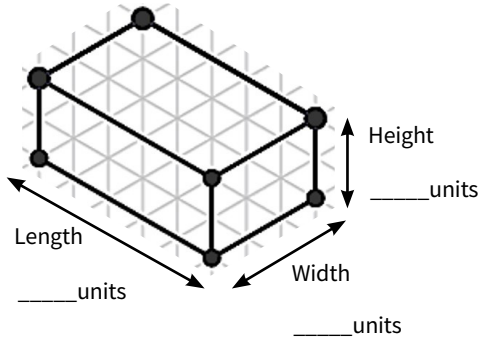
Therefore, its faces are

(i) _____ units by _____ units

(ii) _____ units by _____ units

(iii) _____ units by _____ units

(b)



b. This cuboid is

_____ units by _____ units by _____ units

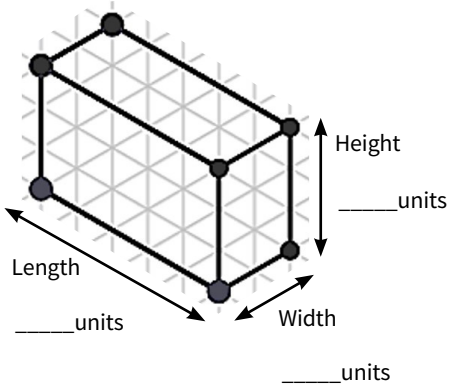
Therefore, its faces are

(i) _____ units by _____ units

(ii) _____ units by _____ units

(iii) _____ units by _____ units

(c)



c. This cuboid is

_____ units by _____ units by _____ units

Therefore, its faces are

(i) _____ units by _____ units

(ii) _____ units by _____ units

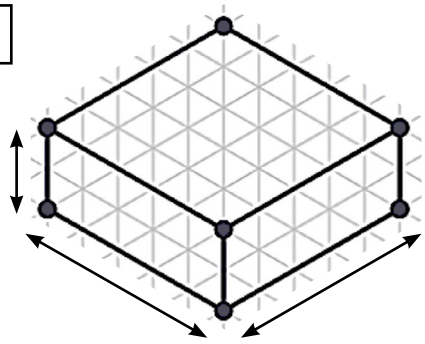
(iii) _____ units by _____ units

Are these cuboids the same or different? Give reasons for your answer.

Worksheet

2. Now find the dimensions of these cuboids. If any of the cuboids have square faces, write down the number of square faces in the box at the top left.

(a) ☐



a. This cuboid is

_____ units by _____ units by _____ units

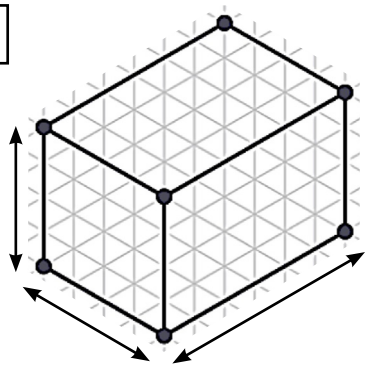
Therefore, its faces are

(i) _____ units by _____ units

(ii) _____ units by _____ units

(iii) _____ units by _____ units

(b) ☐



b. This cuboid is

_____ units by _____ units by _____ units

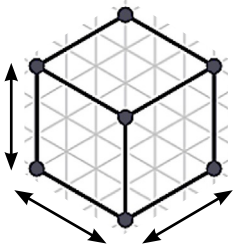
Therefore, its faces are

(i) _____ units by _____ units

(ii) _____ units by _____ units

(iii) _____ units by _____ units

(c) ☐



c. This cuboid is

_____ units by _____ units by _____ units

Therefore, its faces are

(i) _____ units by _____ units

(ii) _____ units by _____ units

(iii) _____ units by _____ units

3. Choose the right answer: The number of square faces that a cuboid can have is:

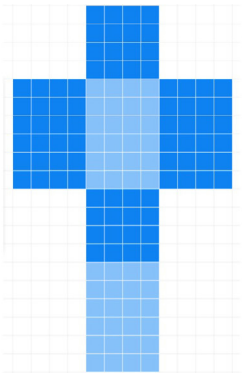
(a) 2, 4 or 6 (b) 0, 3 or 6 (c) 0, 2 or 6 (d) 0, 2, 4 or 6

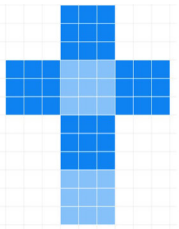
4. If a cuboid has at least one pair of square faces, what do you notice about the remaining faces?

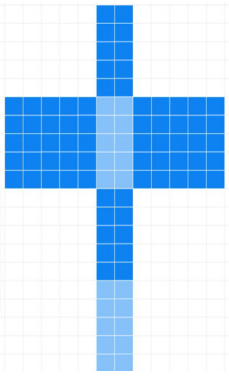
Worksheet

5. Can you match the nets below with the cuboids in Question 2.

Hint: Find the dimensions – length, width, height – of each one.







_____ _____ _____

6. In the grid below, draw the net of any cuboid from Question 1.

Worksheet

7. Pick any 3 numbers (each less than 10). _____, _____, _____

a. Now consider a cuboid with these dimensions, that is, ____ units by ____ units by ____ units

b. Draw a rough sketch of the cuboid and label its dimensions.

c. Draw the net of this cuboid.

Worksheet

This worksheet is inspired by misconceptions that surfaced during the practice teaching internship of Monika Mahaldar, which she did at Azim Premji School, Dhamtari. Monika is a 4th year BSc-BEd (Mathematics) student at Azim Premji University, Bengaluru.

Teachers may identify such misconceptions by asking each student to list at least two daily items that are cuboids with no square faces (phone, pencil box, TV remote, books, etc.).

By exploring the dimensions of different cuboids and viewing them from different perspectives, students arrive at the understanding that a cuboid may or may not have square faces. The teacher could start Question 2 by asking students to identify if all the given solids are cuboids. The questions help them to introspect on the possible number of square faces that a cuboid can have. They may also notice the implication that having one pair of square faces will have on the remaining faces. They move from the cuboid to its net and then from the net to the cuboid. By this exploration, the original misconception provides rich pickings for the introspecting teacher and the curious student.

A second misconception that surfaced is worth mentioning, though not addressed in this article. Sometimes we use squares made of thick material, such as 4mm ethyl vinyl acetate (EVA), or wooden squares with measurable thickness. To children, these are not 2D but 3D, and it reflects in how they use or engage with similar materials. They go beyond the intended use perceived by the adults. So, it is a better idea to use thin material, such as card, with negligible thickness, for squares, rectangles and other 2D shapes.

SWATI SIRCAR is a consultant with Azim Premji University. Mathematics is the second love of her life (the first being drawing). She is a B.Stat-M.Stat from Indian Statistical Institute and an MS in math from University of Washington, Seattle. She has been doing mathematics with children and teachers for more than 15 years and is deeply interested in anything hands on - origami in particular. She initiated Math Space, a mathematics laboratory at the Bengaluru campus of Azim Premji University. It caters to schools, teachers, parents, children, NGOs working in school education and teacher educators. Swati may be contacted at swati.sircar@apu.edu.in