Volume of Solids

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The volume of an object is a measure of the amount of space it occupies. To help students better understand the concept of volume, teachers should prepare physical objects and let students touch them and feel the space they occupy. In this topic, counting the number of unit cubes is the main strategy used to find the volume of solids. This method is then used to derive the formula for the volume of a cuboid, which can be extended to the volume of a cube.

Activity 1 Volume of irregular solids made up of unit cubes

Students learn that the volume of a solid is measured by the number of unit cubes that it is made up of. We can form solids using unit cubes. Provide a pair of students with 50 unit cubes. Let one student use unit cubes to build different solids, and ask the other student to count the number of units used for each solid and derive the volume of each.

Students may miss out on counting the hidden or partially hidden cubes when presented visually with irregular solids made up of unit cubes. When students have difficulty 'seeing' the hidden cubes, teachers can suggest students build the solid figures with the cubes and then take them apart one by one and count each cube.
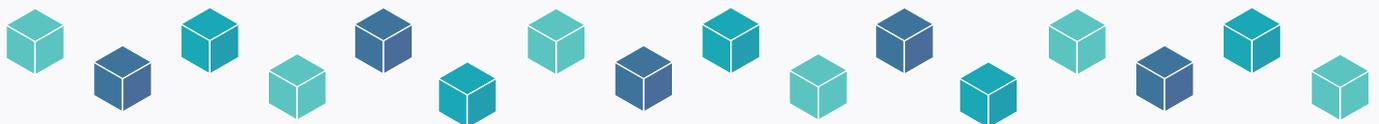
Activity 2 Volume of a cube and cuboid

Prepare two cuboids and have students compare their volumes. Ensure that the cuboids have different but close volumes. Let students use unit cubes to build the two cuboids and then find their volumes. When doing the task, students need to know the length, width and height of the two cuboids, which guide them to think about the relationship between a cuboid's volume and its length, width and height.

Make a cuboid (8 x 4 x 6) with unit cubes and invite students to estimate the volume of the cuboid. Let students discuss how they would find the volume of the cuboid. They could count the total number of cubes used, multiply the length, width and height of the cuboid, and find the number of cubes in a layer and multiply it by the number of layers.

Provide students with some unit cubes. Ask students to follow the worksheet (could be downloaded from the website) to find the volume of the cuboid. The worksheet guides students to build the cuboid layer by layer and find that each layer contains the same number of cubes. This illustrates how the volume of a cuboid is the product of height, length and width. This result generalises the formula for the volume of a cuboid = length x width x height or area x height.

Language support for non-Chinses speaking (NCS) students

- Let students use objects in the shape of cubes and cuboids as models for discussing volume

- Provide each student with a cuboid and help students recall terms (such as edge and surface) that they have learnt related to cuboids

- Let students add vocabulary words to their notebook that includes terms, definitions and examples

Some online resources related to this topic

Finding the volume of solids:
https://www.geogebra.org/m/RR4pRBTC#material/MksGHXAt

Creating cuboids with unit cubes:
https://www.geogebra.org/m/JKscycm7

Finding the volume of rectangular prisms:
https://www.geogebra.org/m/GnEgc5Ua

Finding the volume of a composite solid:
https://www.geogebra.org/m/BDK497G7