

# Calculating the volume of cubes and cuboids

## National Curriculum attainment targets

- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm<sup>3</sup>) and cubic metres (m<sup>3</sup>)
- Recognise when it is possible to use formulae for volume of shapes

## Lesson objective

- Estimate, calculate and compare volume of cubes and cuboids using cubic centimetres (cm<sup>3</sup>), cubic metres (m<sup>3</sup>) and the rule  $V = lbh$

### Previous related lessons

None

### Prerequisites for learning

Pupils need to:

- be able to calculate the volume of a cuboid by counting the number of 1 cm<sup>3</sup> cubes in each layer

### Vocabulary

cube, cuboid, volume, cubic centimetre (cm<sup>3</sup>), cubic metre (m<sup>3</sup>)

### Future related lesson

Unit 10, Week 3, Lesson 4

### Success criteria

Pupils can:

- estimate, calculate and compare volume of cubes and cuboids using cubic centimetres (cm<sup>3</sup>) and cubic metres (m<sup>3</sup>)
- use the rule  $V = lbh$  to calculate the volume of a cube or cuboid



## Getting Started

- Choose an activity from Measurement (volume and capacity).

**Collins**  
Connect  
Year 6, Unit 10,  
Week 3

## Teach

### Resources

1 cm<sup>3</sup> cube (per class)

- Recall that in mathematics the word 'volume' is defined as the amount of space that a three-dimensional shape takes up.
- Say: **This cube has three dimensions namely a length of 1 cm, a breadth of 1 cm and a height of 1 cm. We measure volume in cubic units.**
- Ask: **What is the volume of this cube?** (one cubic centimetre)
- Write on the board: 1 cubic centimetre or 1 cm<sup>3</sup>.
- Ask: **Why do you think we use a small '3' when we write the abbreviated form for cubic centimetres?** Elicit that the small '3' relates to the three dimensions of the shape.
- Display: Slide 1 showing a cuboid made up of 24 cubes.
- Say: **This cuboid is made up of cubes with an edge length of 1 cm.**
- Ask: **How many cubes are there in the top layer?** (12 cubes) **How many layers are there?** (2) **How many cubes are there in the cuboid?** (24) **What is the volume of the cuboid?** (24 cm<sup>3</sup>)
- Display: Slide 2 showing the same cuboid showing its dimensions.
- Ask: **Who can think of a way to find the volume of this cuboid that does not involve counting the number of cubes in each layer?** Elicit that the volume of the cuboid is found by calculating  $4 \times 3 \times 2 = 24$  cubes.
- Display: Slide 3 showing a cuboid showing length, breadth and height.
- Ask: **What is the length of the cuboid?** (4 cm) **What is its breadth?** (3 cm) **What is its height?** (2 cm)
- Ask pairs to discuss how they would calculate the volume of the cuboid. Elicit that the volume of the cuboid is found by multiplying its length by its breadth by its height making 24 cm<sup>3</sup>.
- Write the rule on the board:  $V = l \times b \times h = lbh$
- Say: **In algebra we drop the multiplication signs. Then the letters *lbh* are read as 'length times breadth times height'.**
- Display: Slide 4 showing a second cuboid.
- Ask pairs to use the rule  $V = lbh$  to calculate the volume of the cuboid. Elicit that the volume of 400 cm<sup>3</sup> can be calculated in three ways:  $(10 \times 8) \times 5$  or  $10 \times (8 \times 5)$  or  $(10 \times 5) \times 8$ .



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- Display: Slide 5 showing a cube.
- Ask: **What can you tell me about this 3-D shape?** Elicit that all three dimensions of the cube, length, breadth and height measure 3 cm.
- Ask: **How would you calculate the volume of the cube?** ( $3\text{ cm} \times 3\text{ cm} \times 3\text{ cm} = 27\text{ cm}^3$ )
- Ask: **Who can suggest a suitable unit to measure the volume of a large container carried by a lorry?** (cubic metre) **Can you justify your answer?**

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- Write on the board: cubic metre ( $\text{m}^3$ )
- Display: Slide 6 showing a large container.
- Ask: **What is the volume of this container?** ( $16\text{ m}^3$ )

## Individualised Learning

Refer to Activity 3 from the Learning activities on page 413.

**Pupil Book 6C** – Page 48: Volume of cubes and cuboids

Resource: ruler (per child)

**Progress Guide 6** – Support, Year 6, Unit 10, Week 3, Lesson 3: Volume of cuboids

– Extension, Year 6, Unit 10, Week 3, Lesson 3: Investigating painted cubes

## Plenary

- Write on the board:  $V = lbh$
- Ask: **What do the letters  $lbh$  represent in the rule for the volume of a cuboid?** (length times breadth times height)
- Ask: **What metric unit of volume would you use to measure the volume of a box of tea bags?** (cubic centimetre) ... **to measure the volume of a household cold water tank?** (cubic metre)
- Write on the board: length = 10 cm  
width = 5 cm  
height = 6 cm
- Ask: **What is the volume of this cuboid?** ( $300\text{ cm}^3$ ) **How did you work out your answer?**
- Erase 10 cm and replace with 5 cm and ask the children to calculate the volume of the cuboid. ( $150\text{ cm}^3$ ) Now erase 6 cm and replace with 5 cm and ask the children to calculate the volume and to name the 3-D shape. ( $125\text{ cm}^3$ , cube)
- Ask: **If I halved the length of one/two sides, what would the volume be?**