Calculating the volume of cubes and cuboids and finding missing lengths

National Curriculum attainment targets

- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units (for example, mm^3)
- Recognise when it is possible to use formulae for volume of shapes

Lesson objective

- Calculate and compare volume of cubes and cuboids using cubic centimetres (cm^3), cubic metres (m^3), cubic millimetres (mm^3) and the rule $V = lbh$, and find missing lengths

Previous related lessons

Unit 10, Week 3, Lesson 2; Unit 10, Week 3, Lesson 3

Prerequisites for learning

Pupils need to:

- be able to estimate, calculate and compare volume of cubes and cuboids using cubic centimetres (cm^3) and cubic metres (m^3)

Vocabulary

cube, cuboid, volume, cubic centimetre (cm^3), cubic metre (m^3), cubic millimetre (mm^3)

Future related lessons

None

Success criteria

Pupils can:

- estimate, calculate and compare volume of cubes and cuboids using cubic centimetres (cm^3), cubic metres (m^3) and cubic millimetres (mm^3)
- use the rule $V = lbh$ to calculate the volume of a cube or cuboid and to find missing lengths

Getting Started

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

Collins Connect
Year 6, Unit 10, Week 3

Teach

Resources

1 cm^3 cube (per class); whiteboard, pen and eraser (per child)

- Ask: **How do we calculate the volume of a cuboid?** (by multiplying its length by its breadth by its height)
- Write on the board: $V = lbh$.

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- Display: Slide 1 showing a 7 × 2 × 3 cuboid.
- Ask: **What is the length / breadth / height of this cuboid?** (7 cm / 2 cm / 3 cm)

- Say: Tell your partner what the volume of the cuboid is. (42 cm^3) Ask: **How did you work it out?** ($V = (7 \times 2) \times 3$) **Did anyone have a different way?** ($7 \times (2 \times 3)$ or $(7 \times 3) \times 2$)

- Ask: **If we know that a cuboid has a length of 7 cm, a breadth of 2 cm and its volume is 42 cm^3, who can explain to the class how we find the height of the cuboid?** Take feedback. Elicit that the height of the cuboid is found by dividing its volume by its length times its breadth.
- Write on the board: Height, $h = V \div (lb)$
  $= 42 \div 14$
  $= 3$ cm

2
- Display: Slide 2 showing a cuboid with two marked dimensions and its volume.
- Say: **The side labelled with a question mark is the missing length.** Ask**: What do you estimate the missing length to measure?** (about 6 cm)
- Ask: **Who can explain how to calculate the missing length?** ($60 \div (5 \times 2) = 60 \div 10 = 6$ cm)

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- Display: Slide 3 showing a third cuboid.
- Distribute the whiteboards, pens and erasers.
- Ask pairs to calculate the missing dimension.
- Allow time for this then ask pairs to describe how they calculated the length of the missing side, for example $(120 \div 5) = 24$, $24 \div 8 = 3$ m and $8 \times 5 = 40$, $120 \div 40 = 3$ m.

- Ask: **How can we check our answer?** Elicit using the inverse operation of multiplication to check that 5 × 8 × 3 = 120.
- Repeat as above for a cube with two sides of edge length 5 cm and a volume of 125 cm³.
- Display: Slide 4 showing a fish tank.
- Ask: **What do you notice about the dimensions of the fish tank?** (given in millimetres)
- Ask pairs to calculate the volume of the fish tank in cubic millimetres.
- Allow time for this then ask the children to explain how the found the answer of 72 000 000 mm³, for example, 600 × 400 × 300 or (60 × 40 × 30) × 1000 or (6 × 4 × 3) × 1 000 000.
- Ask: **What is the volume of the fish tank in cubic centimetres?** (72 000 cm³)
- Hold up the 1 cm³ cube. Elicit that it has sides of 10 mm and a volume of 1000 mm³.
- Ask: **Who can think of an easier way to calculate the volume of the fish tank in cubic millimetres?** Elicit that we can convert the lengths to centimetres, calculate the volume in cubic centimetres, then multiply the answer by 1000 to convert it to cubic millimetres.

Individualised Learning

Refer to Activity 4 from the Learning activities on page 413.

Pupil Book 6C – Page 50: Calculating volume and finding missing lengths

Resources: ruler (per child)

Plenary

- Ask the children to review what they have learned about calculating the volume of cubes and cuboids using cubic centimetres, cubic metres and cubic millimetres.
- Display: Slide 5 showing the Pupil Book page.
- Take each question in turn and ask the children to explain to the class how they found the missing length. Focus on the reasons that the children give in their choice of the first number to divide the volume by. Stress the importance of using the inverse operation to check answers.

Homework Guide 6

Year 6, Unit 10, Week 3, Lesson 4: Calculating volume