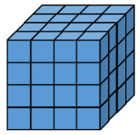
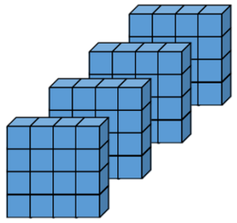
Year 5 Unit 13: Volume (1 week)

Before you start…

Throughout the unit, pupils will require a considerable amount of multilink cubes to use.

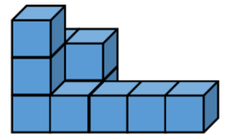
- *Before beginning lesson 1 consider the following:*
- *How familiar are your pupils with square numbers and squared notation?*
- *How secure is your pupils' understanding of capacity and its units of measurement (ml and l)?*

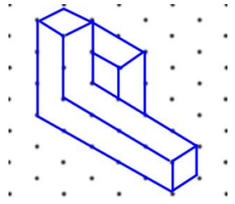




$4^3 = 4 \times 4 \times 4$

The abstract notation cm^2 can be read as 'centimetres squared' and 'square centimetres' both of which are commonly used. Similarly, cm^3 can be referred to as 'centimetres cubed' or 'cubic centimetres'. Pupils need to know both and understand that they mean the same thing and can be used interchangeably.





Understanding cube numbers

L1 Understand and use cube numbers and cubed notation

Pupils consolidate their understanding of square numbers and square notation and use this as a basis of developing their conceptual understanding of cube numbers and cube notation, which they explore using multilink cubes.

? *What thinking will you model aloud? What will you say and do?*
? *How will you organise pupils and resources to ensure all pupils have opportunity to explore using multilink whilst having opportunity to spot patterns and generalise?*

Estimating the volume of solids

L2 Use centimetre cubes to estimate volume
L3 Visualise and estimate the volume of solids

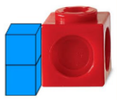
Pupils discuss the meaning of volume and then establish the value of 1 cm^3; they use cubes to build other shapes and work out their volume before applying their understanding to estimate the volume of classroom objects. In lesson three, pupils will link concrete representations to pictorial; pupils will explore by both drawing pictorial representations and building concrete representations based on a pictorial representation.

? *What language will be necessary to draw attention to connections between the representations you plan to use?*

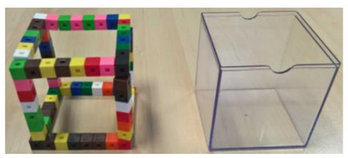
Video: *Representing solids pictorially*

Building Conceptual Understanding

Some pupils may have prior knowledge of procedures to calculate volume of solids and it is important that they develop the meaningful understanding to go with these. Using irregular objects for estimating volume will help avoid reliance on procedures.



A Dienes cube measures $1cm^3$, which makes them a useful tool to support pupils' estimations. One larger multilink cube measures 2cm × 2cm × 2cm and therefore has a volume of 8 cm^3.Pupils may prefer to use this fact along with larger multilink cubes to support their estimations for larger objects/containers.



This unit has 4 planned lessons with lesson 5 as a suggested consolidation lesson. The content of this lesson should be adapted based on the outcomes of previous lessons.

Connecting the volume of solids with the volume of liquids and gasses

L4 Convert units of volume

Pupils use measuring containers and Dienes blocks to explore the relationship between cubed centimetres and litres. They revise the relationship between litres and millilitres through investigating the volume of cubes and calculating the volume of air inside a range of measuring cylinders.

? *What questions and prompts might you use while pupils work on the tasks to draw their attention to key features of the concept and address misconceptions?*

ml or cm^3 ?

The volume of an object is the amount of three-dimensional space that it occupies. Liquid volume and solid volume are conventionally measured in different units. Liquid volume is measured in litres and millilitres etc., while solid volume is measured in cubic metres and cubic centimetres. 1 ml is equal to 1 cm^3 and 1 litre is equal to 1000 cm^3.