Maths - Year 6

# Measurement 4: Volume and scaling

Key Vocabulary

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Volume	How much space something takes up.
Units of measure for length	Millimetres (mm), centimetres (cm), metres (m), kilometres (km).
Area	An amount of surface.
Units of measure for area	Square millimetres (mm²), square centimetres (cm²), square metres (m²), square kilometres (km²).
Units of measure for volume	Cubic millimetres (mm³), cubic centimetres (cm³), cubic metres (m³), cubic kilometres (km³).
Square numbers	When a number is multiplied by itself, the product is called a square number.
Cube numbers	When a number is multiplied by itself twice, the product is called a cube number, e.g. 2 x 2 x 2 = 2^3 = 8, so 8 is a cube number.
Scaling up/down Enlarge/reduce	Describes the amount by which something is increased or reduced to make it larger or smaller in proportion, e.g. when scaling up a recipe for 2 to a recipe for 6, you would multiply the quantities by 3.
Scale factor	Describes the factor by which the length of each side is multiplied when a shape is made larger or smaller in proportion.
Ratio	A way of comparing two or more quantities measured in the same units, e.g. if *a* is 3 times as much as *b* this comparison can be written as the ratio *a* : *b* is 3 : 1.
Proportion	Used to express a fraction of a whole, e.g. the proportion of grapes in a bag that are green could be expressed as ½ .

Mathematical Skills

- Explain how to calculate the volume of a cuboid and that the three dimensions can be multiplied in any order.
- Know that 1 cm³ is a measurement of solid volume and is equal to 1 ml, the liquid volume equivalent.
- Compile a list of equivalences for metric units of length, area and volume.

Mathematical Methods

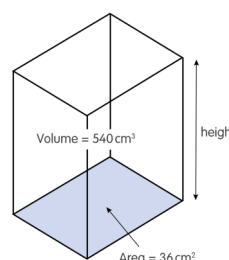- Identifying a formula for calculating the volume of a cuboid.
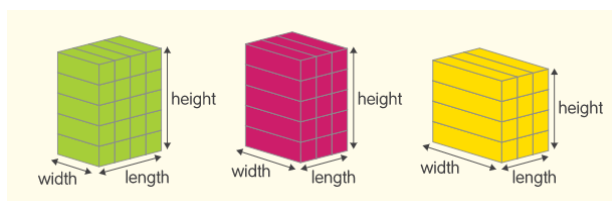
Volume = length × width × height or $V = l \times w \times h$.
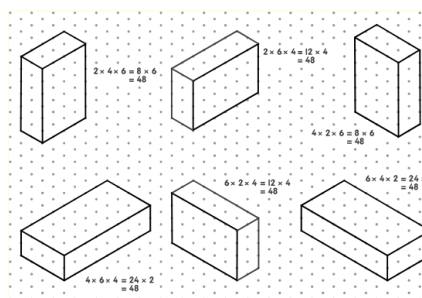
- Solving problems using understanding of the volume of a cuboid
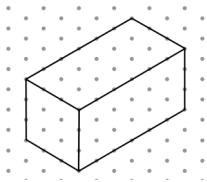
E.g. Use *V* = *l* x *w* x *h* to solve *h.*

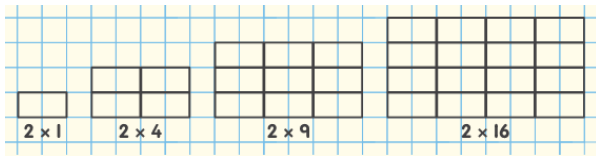- Exploring units of volume.

Length	Area	Volume
10 mm = 1 cm	100 mm² = 1 cm²	1000 mm³ = 1 cm³ = 1 ml
100 cm = 1 m	10 000 cm² = 1 m²	1 000 000 cm³ = 1 m³ = 1000 ℓ
1000 m = 1 km	1 000 000 m² = 1 km²	1 000 000 000 m³ = 1 km³ = 1000 000 000 000 ℓ

- Understanding scaling and similar shapes.

Cuboid 3	Scale factor	Width (cm)	Length (cm)	Height (cm)
A	1	3	6	3
B	3	9	18	9

- Investigating the effect of scaling on length and area.

2 × 1   2 × 4   2 × 9   2 × 16

Oblong	Side length (units)	Area (square units)
A	1	2	2
B	2	4	8
C	3	6	18
D	4	8	32

Scale factor for length	Scale factor for area
1	1 = 1²
2	4 = 2²
3	9 = 3²
4	16 = 4²

Can you..?

- A scaled drawing of an oblong measures 5.5cm x 6cm. Can you work out the area of the actual oblong which is 6 times larger?

- A cuboid with a volume of 72cm³ is scaled up by 4. Can you work out the new cuboid's volume?