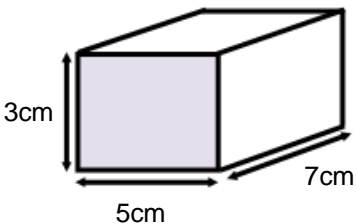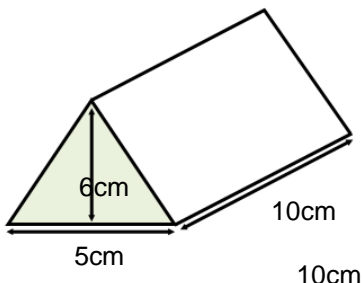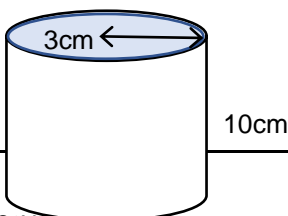## Guidance for tutors

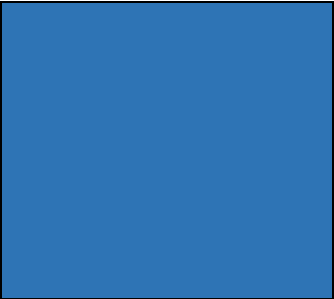| Outcome	SLAV4	Student can consistently:	Find the volume of cubes, cuboids and other prisms including cylinders.
How the topic is examined			- Examined through test paper questions. - Questions are equally likely to appear on calculator and non-calculator papers. - If a question appears on a non-calculator paper students may be expected to leave their answer in terms of π if it has circular parts. - Increasingly examination questions are asking students to use the volume of a prism to solve a real life problem (e.g. problems involve density) - Questions could have integer, fractional, decimal and surd valued sides.
Prior knowledge			- Students should be confident with: - Multiplying and dividing without a calculator. - Finding the area of basic shapes (SLAV1) - Finding the circumference and area of a circle (SLAV2) - Compound shapes (SLAV3) - In addition questions involving this topic can have links to: - Density. - Volume of cones, spheres and pyramids (SLAV8)
Suggested tuition approaches			- A prism is a shape that has the same cross section throughout (e.g. a cube has a square cross-section, cuboid rectangular cross-section, triangular prism has a triangular cross-section etc…) - A cylinder has a circular cross section. - To find the volume of any prism you would find the area of the cross section and multiply by the height/depth/length of the shape depending on the orientation. - A prism may have a compound cross-section. - Some students prefer to remember specific formulae for different prisms. - Here are some examples. In each example the cross-section has been shaded.

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Shape	Notes
Cube or cuboid 3cm, 7cm, 5cm	$Volume = length \times width \times height = lwh$ $Volume = 5 \times 3 \times 7 = 105\ cm^3$ You can use the formula Volume = Area of cross-section multiplied by length. You would get the same volume. Area of cross section = 3 x 5 = 15 Volume = 15 x 7 = 105cm³
Triangular prism 6cm, 5cm, 10cm, 10cm	$Volume = length \times base \times height \div 2 = \dfrac{lbh}{2}$ $Volume = \dfrac{5 \times 6 \times 10}{2} = 150\ cm^3$ You can use the formula Volume = Area of cross-section multiplied by length. You would get the same volume. Area of cross section = $\frac{1}{2} \times 5 \times 6$ = 15 Volume = 15 x 10 = 150cm³
Cyclinder 3cm, 10cm	$Volume = \pi \times radius^2 \times height = \pi r^2 h$ $Volume = \pi \times 3^2 \times 10 = 90\pi\ cm^3 = 283\ cm^3$

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- A prism may have a cross section that is a compound shape.

- For a shape like this you will need to use the notes on finding an area of compound shapes.
- Sometimes questions ask students to use the volume to solve further problems (e.g. find the density)

Common errors and misconceptions

- Students forget to put units – particularly when answers are given in terms of π
- If units are not the same, students need to convert one to the other.
- Errors are made when working out the volume without a calculator.
- One mark is given for 'stating the units' of an answer – many students lose the mark because they forget to or state the wrong units.
- When splitting a shape up students struggle to work out the lengths of missing sides that they might need to use.
- When finding the volume of a triangular prism, students forget to divide by 2.

Suggested resources

- Questions
  - http://www.cimt.org.uk/projects/mepres/allgcse/pr7-sa.pdf (pp 25 - 31)
  - https://corbettmaths.files.wordpress.com/2013/02/volume-of-a-cuboid-pdf.pdf (cube/cuboid)
  - https://corbettmaths.files.wordpress.com/2013/02/volume-of-a-prism-pdf.pdf (prism)
  - https://corbettmaths.files.wordpress.com/2013/02/volume-of-a-cylinder-pdf.pdf (cylinder)
  - http://corbettmaths.com/2013/03/24/volume-of-an-l-shape-prism/ (compound shapes)
- Past GCSE Questions

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	- https://keshgcsemaths.files.wordpress.com/2013/11/72_volume-of-prism.pdf - https://keshgcsemaths.files.wordpress.com/2013/11/73_volume-and-surface-area-of-cylinder.pdf - Video tutorial - http://corbettmaths.com/2012/08/09/volume-of-cuboids-and-cubes/ (cube/cuboid) - http://corbettmaths.com/2013/04/20/volume-of-a-prism/ (prism) - http://corbettmaths.com/2013/02/15/volume-of-a-cylinder/ (cylinder) - http://corbettmaths.com/2013/03/24/volume-of-an-l-shape-prism/ (compound shape)