Guidance for tutors
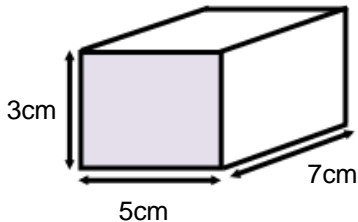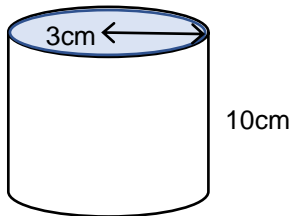
Outcome	SLAV5	Student can consistently:	Find the surface area of cuboids and cylinders and other prisms.
How the topic is examined			• Examined through test paper questions. • Questions are equally likely to appear on calculator and non-calculator papers. • If a question appears on a non-calculator paper students may be expected to leave their answer in terms of π if it has circular parts (e.g. cylinder) • Increasingly examination questions are asking students to use the surface area of a cube, cuboid or cylinder to solve a real life problem (e.g. painting the outside of a box) • It is rare for students to find the surface area of a prism other than cube, cuboid and cylinder. • 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:
			    ○ Volume and surface area of cones, spheres and pyramids (SLAV8)

Suggested tuition approaches			• The surface area of a prism is the sum of all the areas of the faces of the prism. • Most likely students will have to find the surface area of a cube, cuboid or cylinder. It is unlikely they will be given any other prism. • To find the surface area students should consider each surface and then find the area. The total surface area is these shapes all added together. • The surface area of a cube is area of each square face multiplied by 6. So $Total\ surface\ area = (length^2) \times 6$ • For other shapes, students sometimes work out the area of each face in systematic order and then add up all the areas. The table below shows this:

Guidance for tutors

Shape	Notes
Cuboid	Front face = 3 x 5 = 15 cm² Back face = 3 x 5 = 15 cm² Left side face = 7 x 3 = 21 cm² Right side face = 7 x 3 = 21 cm² Top face = 7 x 5 = 35 cm² Bottom face = 7 x 5 = 35 cm² Total surface area = 142 cm² Units are square units because it is an area.
Cyclinder	$$Area\ of\ top = \pi \times radius^2 = \pi \times 3^2 = 9\pi$$ Area of base = 9π Curved surface area (front face) = circumference x height $$Curved\ SA = \pi \times D \times height = \pi \times 6 \times 10 = 60\pi$$ Total surface area = $9\pi + 9\pi + 60\pi = 78\pi\ cm^2$ It is better to work with exact values that include π rather than working everything out to decimal each time. Working out decimals can lead to accuracy errors later. Some students may want to remember and use the formula: $$Surface\ area = 2\pi r^2 + 2\pi rh = 2\pi r(r + h)$$

Guidance for tutors

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. - When working with answers on a calculator try to avoid rounding prematurely. Use exact answers where students can. - One mark is given for 'stating the units' of an answer – many students lose the mark because they forget to or state the wrong unit. - When splitting a shape up students struggle to work out the lengths of missing sides that they might need to use. - Keep work ordered and ensure you add up all numbers at the end. - Students often forget to include faces they cannot see in the surface area calculation (e.g. base of a cuboid or cylinder often forget to be added in to a calculation)
Suggested resources	- Questions - http://www.cimt.org.uk/projects/mepres/allgcse/pr7-sa.pdf (pp 38 - 40) - https://corbettmaths.files.wordpress.com/2013/02/surface-area-of-a-cuboid.pdf - https://corbettmaths.files.wordpress.com/2013/02/surface-area-of-l-shaped-prism-pdf.pdf - https://corbettmaths.files.wordpress.com/2013/02/surface-area-of-a-cylinder-pdf.pdf - Past GCSE Questions - https://keshgcsemaths.files.wordpress.com/2013/11/71_surface-area.pdf - https://keshgcsemaths.files.wordpress.com/2013/11/73_volume-and-surface-area-of-cylinder.pdf - Video tutorial - http://corbettmaths.com/2013/03/29/surface-area-of-an-l-shape-prism/ - http://corbettmaths.com/2013/04/04/surface-area-of-a-cylinder/