

Volume of 3D Shapes Mark Scheme:		
1	$3 \times 12 \times 16 = 576 \text{ cm}^3$	[1]
2	$Volume = \frac{a^2h}{3} = \frac{5^2 \times 12}{3}$	[1] Substitution of values
	$Volume = 100 \text{ m}^3$	[1] Correct answer
3(a)	<p>Diagram description: A composite shape representing a cross-section. It has a square base with side length 4 cm (area <math>4 \times 4 = 16</math>). Attached to the right side of the square is a rectangle with a width of 3 cm and a height of 2 cm (area <math>2 \times 3 = 6</math>). The total width of the composite shape is 7 cm, and the total height is 2 cm.</p>	[1] Correct method
	Area of Cross section = $16 + 6 = 22 \text{ cm}^2$	[1] Correct answer
3(b)	Volume = area of cross section $\times$ length $= 22 \times 3 = 66 \text{ cm}^3$	[1] Substitution of values
4	$Volume = \pi r^2 h$ $Volume = \pi \times 4.5^2 \times 2 = 127.23 \text{ cm}^3$	[1] Substitution of values
	$127.23 \text{ cm}^3$	[1] Correct answer
5	$Volume \text{ of sphere} = \frac{4}{3} \pi r^3$	[1] Substitution of values
	$Volume = \frac{4}{3} \times \pi \times 4^3 = \frac{256\pi}{3}$	[1] Correct answer
6	Substituting these values into the formula to find h: $1500 = 8^2\pi h$ $1500 = 64\pi h$	[1] Substitution of values
	$h = \frac{1500}{64\pi} = 7.46 \text{ (2dp)}$	[1] Rearranging to find h
	The water reaches 7.46 cm from the base of the cylinder.	[1] Correct answer

Turn over ►

7	$\frac{1}{3} \times h \times \pi r^2$ $h = 10 \quad r = 3$	[1] Correct volume formula
	$\frac{1}{3} \times 10 \times \pi \times 3^2 = \frac{1}{3} \times 90\pi = 30\pi$	[1] Substitution of values
	$\text{Volume} = \frac{\frac{4}{3} \times \pi \times 3^3}{2} = \frac{108\pi}{6} = 18\pi$	[1] Volume of hemi-sphere
	$18\pi + 30\pi = 48\pi$	[1] correct answer
8	$\text{Volume} = x^2 \frac{3h}{3}$ $\text{Volume} = x^2 h$	[1] Volume of larger pyramid
	$\text{Volume} = \left(\frac{x}{2}\right)^2 \frac{2h}{3}$ $\text{Volume} = \frac{x^2}{4} \times \frac{2h}{3} = \frac{x^2 h}{6}$ <p style="text-align: center;"><i>Volume of water</i> = Larger Pyramid - Smaller Pyramid</p>	[1] Volume if smaller pyramid
	$\text{Water volume} = x^2 h - \frac{x^2 h}{6} = \frac{5x^2 h}{6}$ <p style="text-align: center;"><i>Proportion filled</i> = Water volume <math>\div</math> Larger pyramid</p> $\frac{5x^2 h}{6} \div x^2 h$	[1] Smaller volume divided by larger volume
	$\frac{5}{6}$	[1] Correct answer simplified

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