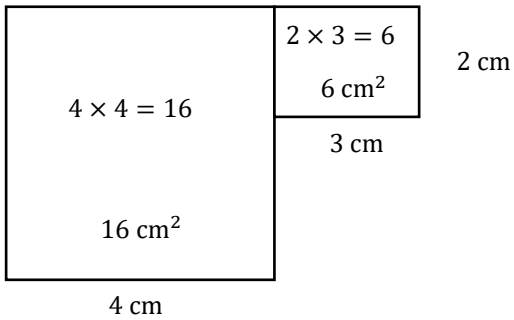
Volume of 3D Shapes Mark Scheme		
1	$3 \times 12 \times 16 = 576 \text{ cm}^3$	[1]
2	$\text{Volume} = \frac{a^2 h}{3} = \frac{5^2 \times 12}{3}$	[1] Substitution of values
	$\text{Volume} = 100 \text{ m}^3$	[1] Correct answer
3(a)		[1] Correct method
	Area of Cross section $= 16 + 6 = 22 \text{ cm}^2$	[1] Correct answer
3(b)	$\text{Volume} = \text{area of cross section} \times \text{length}$ $= 22 \times 3 = 66 \text{ cm}^3$	[1] Substitution of values
4	$\text{Volume} = \pi r^2 h$ $\text{Volume} = \pi \times 4.5^2 \times 2 = 127.23 \text{ cm}^3$	[1] Substitution of values
	127.23 cm^3	[1] Correct answer
5	$\text{Volume of sphere} = \frac{4}{3}\pi r^3$	[1] Substitution of values
	$\text{Volume} = \frac{4}{3} \times \pi \times 4^3 = \frac{256\pi}{3}$	[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
	$h = \frac{1500}{64\pi} = 7.46 \text{ (2 dp)}$	[1] Rearranging to find h
	The water reaches 7.46 cm from the base of the cylinder.	[1] Correct answer

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
	$18\pi + 30\pi = 48\pi \text{ cm}^3$	[1] Correct answer
8	$\text{Volume} = x^2 \ \frac{3h}{3}$ $\text{Volume} = x^2 \ h$	[1] Volume of larger pyramid
	$\text{Volume} = \left(\frac{2x}{3}\right)^2 \times \frac{2h}{3}$ $\text{Volume} = \frac{4x^2}{9} \times \frac{2h}{3} = \frac{8x^2h}{27}$ Volume of water $=$ Larger Pyramid – Smaller Pyramid	[1] Volume of smaller pyramid
	$\text{Water volume} = x^2h - \frac{8x^2h}{27} = \frac{19x^2h}{27}$ Proportion filled $=$ Water volume ÷ Larger pyramid $\frac{19x^2h}{27} \div x^2h$	[1] Smaller volume divided by larger volume
	$\frac{19}{27}$	[1] Correct answer simplified

END