Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19 **Q1**	905	P1	for correct use of formula for the volume of a sphere eg $\frac{1}{4} \times \frac{4}{3} \times \pi \times r^3$ (= 576π or 1809…) **OR** $576\pi \times 4$ **or** 2304π **or** 7238…($=\frac{4}{3} \times \pi \times r^3$)	We do not need to see what is in the brackets to award this mark. The contents of the bracket alone would score P0
		P1	for a complete correct process to find r, eg $r = \sqrt[3]{\frac{576 \times 4 \times 3}{4}}$ **or** $r = 12$	Could be shown in several stages $\sqrt[3]{\frac{576 \times 4 \times 3}{4}} = \sqrt[3]{1728}$
		P1	for a process to find the curved surface area eg $\frac{4 \times \pi \times [radius]^2}{4}$ (=144π or 452…) **OR** the surface area of both flat surfaces eg $(2 \times \frac{\pi \times [radius]^2}{2})$ **OR** complete expression for the total surface area eg $\frac{4\pi r^2}{4} + \frac{\pi r^2}{2} \times 2$ oe	Radius used must be clearly identified as their radius of the solid
		P1	for process to find the complete surface area eg $\frac{4 \times \pi \times [radius]^2}{4} + (2 \times \frac{\pi \times [radius]^2}{2})$	
		A1	answer in the range 904.7 – 905 or 288π (SCB2 for an answer in the range 358.1 – 359.2)	If an answer is given in the range but then incorrectly rounded, award full marks.

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15 **Q2**	48	M1	for method to use a volume formula with correct substitution for the cone, sphere or hemisphere eg $\frac{1}{3} \times \pi \times 3^2 \times 10$ **or** $\frac{4}{3} \times \pi \times 3^3$ **or** $\frac{2}{3} \times \pi \times 3^3$ oe	May work without π or with an approximation of π; must use the correct radius of 3 (and 10) in substitution
		M1	for complete method to find total volume eg $\frac{1}{3} \times \pi \times 3^2 \times 10 + \frac{2}{3} \times \pi \times 3^3$	
		M1	(dep first M1) for correct partial simplification, eg 30π **or** 18π*!!*	Must be cone or hemisphere
		A1	cao SC B2 for answer of 264 or 264π	Accept 48π

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18 **Q3**	160π	P1	for process to find curved surface area of cone, eg $\pi \times 10 \times 25$ (= 250π) (= 785…..)	
		P1	for process to find the radius or diameter of the smaller cone eg $10 \times \frac{15}{25}$ (= 6) **or** $20 \times \frac{15}{25}$ (= 12) oe **OR** uses area scale factor, eg "250π" $\times \left(\frac{15}{25}\right)^2$ (= 90π)	15 comes from 25 – 10 $\frac{15}{25}$ may be seen as 0.6
		P1	for a complete process, eg "250π" – $\pi \times$ "6" $\times$ 15 (= 785… – 282…) **or** answer in range 502 to 503	
		A1	for 160π	Award 0 marks for an answer of 160π or an answer in range 502 to 503 with no supportive working. If 160π seen but answer in range 502 to 503 given on answer line isw and award full marks

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7 **Q4**	Shown	M1 M1 M1 A1	for a correct expression for the area of one face of the cube, eg x^2 **or** a correct expression for the surface area of the cube, eg $6 \times x^2$ for a correct expression for the surface area of the sphere, eg $4 \times \pi \times 3^2 (= 36\pi)$ for forming a suitable equation, eg $6 \times x^2 = 4 \times \pi \times 3^2$ **or** $6x^2 =$ "36π" for completing the method to $x = \sqrt{6\pi}$ or $k = 6$	No marks for $x = \sqrt{6\pi}$ without any working. $6 \times x^2 = 4 \times \pi \times 3^2$ $x^2 = 36\pi \div 6$ $x = \sqrt{6\pi}$

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20 **Q5**	3.75	P1	works to find vol of frustum eg $1/3\pi(3.6)^2\times6.4 - 1/3\pi(1.8)^2\times3.2$ or 86.858.. – 10.857… (=24.192π or 76.00..)	
		P1	works to find vol of hemisphere eg $\frac{1}{2}\times\frac{4}{3}\pi\times3.6^3$ (=31.104π or 97.7....)	781.7… by use of diameter does not get the mark
		P1	mass of frustum as [vol]×density eg "76.00" × 2.4 (=182.4..) **or** mass of hemisphere as [vol]×density eg "97.7...."×4.8 (=469.037...)	[vol] is their volume which could be ft using the radius, using the diameter, or could be another value as long as it is stated as being the volume, or clearly intended from working.
		P1	mean density as total mass ÷ total volume eg ("182.4.." + "469.037") ÷ ("76…" + "97.7..") or "651.4..". ÷ "173.7...."	All figures must come from correct method shown.
		A1	answer in the range 3.7 to 3.8	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19 **Q6**	155	M1	for a complete method to find the volume of the hemisphere, eg $\frac{1}{2}\times\frac{4}{3}\times\pi\times4.2^3$ oe	
		A1	answer in range 155 to 155.2	If an answer in the range is seen in working and then incorrectly rounded award full marks

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
23 **Q7**	264	P1	correct substitution into the volume formula, eg $56.8 = \frac{1}{3} \times \pi \times r^2 \times 3.6$	
		P1	completes process to find base radius **or** the value of r^2, eg $r = \sqrt{\frac{56.8 \times 3}{\pi \times 3.6}}$ (=3.88158…) or $r^2 = \frac{56.8}{1.2\pi}$ (=15.066)	
		P1	Uses Pythagoras to find the sloping length, eg $\sqrt{"3.88\ldots"^2 + 3.6^2}$ (=5.29..…)	
		P1	process to find an equation in *AOB*, eg $\pi \times$ "3.88" $\times$ "5.29" $= \frac{AOB}{360} \times \pi \times$ "5.29"^{2} **or** $\frac{AOB}{360} \times \pi \times 2 \times$ "5.29" $= 2 \times \pi \times$ "3.88" **or** $\frac{AOB}{360} \times$ "5.29" = "3.88"	*AOB* does not need to be the subject of the equation
		A1	answer in the range 263.9 to 264.1	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
24 (a)	1 : 4	P1	for process to equate the two volumes, $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$	
		A1	cao	
(b)	$1 : \sqrt{8}$	P1	for process to equate surface areas, eg $4\pi r^2 = \pi r^2 + \pi rl$	Can be implied by $3r = l$
Q8		P1	for process to substitute $l = \sqrt{h^2 + r^2}$, eg $4\pi r^2 = \pi r^2 + \pi r\sqrt{h^2 + r^2}$	
		P1	for process to isolate term in r^2 after substituting for l, eg $8r^2 = h^2$	
		A1	for $1 : \sqrt{8}$	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
17 (a) **Q9**	25.9	P1	for process to find volume of hemisphere, eg $\frac{1}{2}\times\frac{4}{3}\times\pi\times3.5^3$ (=89.797…) $\left(\frac{343\pi}{12}\right)$ **or** for a correct expression for the volume of the cone, eg $\frac{1}{3}\times\pi\times3.5^2(y-3.5)$ or $\frac{1}{3}\times\pi\times3.5^2\times h$	'y – 3.5' may be seen as a new variable, but cannot be just y Condone missing brackets Accept decimals rounded or truncated to 1dp
		P1	for setting up an equation linking all three aspects, eg $\frac{1}{2}\times\frac{4}{3}\times\pi\times3.5^3+\frac{1}{3}\times\pi\times3.5^2(y-3.5)=120\pi$ **or** "89.797…" + "12.828…"(y – 3.5) = "376.99 …" **or "**28.5833…" π + "4.0833..." π(y – 3.5) = 120π	120π - "89.797..." = 287.193... or $\frac{1097\pi}{12}$ π may be missing throughout Award of this mark implies award of the previous May be seen in multiple steps
		P1	for process to isolate y or (y – 3.5) or h in their equation, eg $\frac{120\pi-\frac{1}{2}\times\frac{4}{3}\pi3.5^3+\frac{1}{3}\pi3.5^3}{\frac{1}{3}\pi3.5^2}$ **or** $\frac{"376.99..."-"89.797..."+"44.898..."}{"12.828..."}$ **or** $\frac{120\pi-"28.583..."\pi+"14.291..."\pi}{"4.083..."\pi}$ oe	
		A1	for answer in range 25.8 to 26.3 SCB3 for an answer in the range 22.3 to 22.8 or $\frac{1097}{49}$	If an answer is given in the range in working and then rounded incorrectly award full marks.

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
(b)	explanation	C1	for explanation, eg **Acceptable examples** the height would decrease the height would be 0 at 14.227 *y* would be smaller it would decrease **Not acceptable examples** the height would increase	