

Volume 1 (May 05 Paper 4, Qu. 6)

6 (a)	Vol of cyl. = $\pi \times 0.35^2 \times 16.5$ (6.3...)	M1	<u>USE OF RADIUS = 0.7</u>	
	Vol of cone = $\pi \times \frac{0.35^2}{3} \times 1.5$ (0.19...) a.r.t. 6.54 (cm ³)	M1 A1	Use of radius = 0.7 loses all marks in (a) After that they can revert to 0.35 without penalty Any later use of 0.7 after 0.35 penalty 2 from the marks gained using 0.7	(a)
(b)(i)	4.2	B1	8.4	B1
	1.4	B1	2.8	B1
(ii)	18 × their 4.2 × their 1.4 106 (cm ³) (105.84)	M1 A1	18 × their 8.4 × their 2.8 423 (cm ³) (423.36)	M1 A1
	12 × their (a) × 100 their (b)(ii) 74.0 to 74.2 (%) c.a.o.	M1 A1	<u>12 × their (a) × 100</u> their (b)(ii) 74.1 to 74.3 (%)	M1 A1
(c)(i)	(l =) $\sqrt{1.5^2 + 0.35^2}$ 1.54 (cm)	M1 A1	(l =) $\sqrt{1.5^2 + 0.7^2}$ 1.66 (cm)	M1 A1
	Circle = $\pi \times 0.35^2$ Cylinder = $2 \times \pi \times 0.35 \times 16.5$ Cone = $\pi \times 0.35 \times$ their (c)(i)	M1 M1 M1	Circle = $\pi \times 0.7^2$ Cylinder = $2 \times \pi \times 0.7 \times 16.5$ Cone = $\pi \times 0.7 \times$ their (c)(i)	M1 M1 M1
(ii)	Any 2 correct areas (a.r.t. 0.385 a.r.t. 36.3 a.r.t. 1.69) 0.1225 π 11.55 π 0.539 π 38.3 to 38.4 (cm ²) c.a.o.	B2 A1	Any 2 correct areas (a.r.t. 1.54 72.5 to 72.6 a.r.t. 3.65) 0.49 π 23.1 π 1.162 π 77.7 to 77.8 (cm ²)	B2 A1
		17		

Volume 2 (May 03 Paper 4, Qu. 6)

6	(a)	$2x(x+4)(x+1) \text{ (cm}^3\text{)}$ $2x^3 + 10x^2 + 8x \text{ (cm}^3\text{)}$	B1 B1 (2)	Must see this. Ignore further <u>correct</u> work.
	(b)	$2x - 2, x + 2, x$ Internal volume = $2x^3 + 2x^2 - 4x$ Wood = his (a) – his(Int. Vol.) Correctly simplifies to $8x^2 + 12x$	B3 B1 M1 A1 (6)	B1 each correct answer, any order <u>but in this form</u> (Both could be wrong) No errors
	(c)	(i) $\left. \begin{array}{l} 8x^2 + 12x = 1980 \\ 2x^2 + 3x - 495 = 0 \end{array} \right\}$ $\frac{p \pm \sqrt{q}}{r} \text{ form} \Rightarrow p = -3 \text{ and } r = 4 \text{ or}$ 2×2 \Downarrow $\Rightarrow q = 3^2 - 4 \cdot 2 - 495$ $\Rightarrow x = 15 \quad \text{www}$ $\Rightarrow x = -16.5 \text{ or } -\frac{33}{2} \quad \text{www}$	B1 (1) B1 B1 B1 B1 (4)	No error seen. Needs = 0 Alt. method B2 $(x-15)(2x+33)$ or SC1 for sign error(s) in brackets Or $q = 3969$ or $\sqrt{q} = 63$. Allow for $p \mp \frac{\sqrt{q}}{r}$ If factorising method used, answers only score if correct <u>and</u> from correct bracket
		(ii) Uses +ve answer * $30 \text{ by } 19 \text{ by } 16$	B1 $\sqrt{B1}$ (2)	Rejects –ve solution explicitly or implicitly $\sqrt{2}(\text{his}), (\text{his}) + 4, (\text{his}) + 1$

Volume 3 (Oct 05 Paper 4, Qu. 7)

7	(a)(i)	$\frac{1}{2}(2.5+1.1) \times 35$ o.e. 63	M1 A1	
	(ii)	their (a) $\times 24$ 1512	M1 A1ft	
	(iii)	1512000	B1ft	their (a)(ii) $\times 1000$
	(b)(i)	$35.03 \times 24 \times 2.25$ 1891.62...	M1 A1	www2
	(ii)	1900	B1ft	their b(i) rounded to nearest 100
	(c)(i)	$\pi \times 12.5^2 \times 14$ 6870 or better	M1 A1	(6872.2339 or 6873.125 ($\pi = 3.142$))
	(ii)	[their (a)(ii) \div their (c)(i)] $\times 1\,000\,000$ $\div (60 \times 60 \times 24)$ 2 days 13 hours	M1 A1 M1 A1	o.e. e.g. using litres Implied by 2.54 www4
				[14]

Volume 4 (Oct 06 Paper 4 Qu. 3)

3(a)	$0.5(1.1 + 1.4) \times 0.7$	oe	M1	M marks available for 2sf answers ww here
	0.875	cao	A1	www 2
	their (a) $\times 500$		M1	
	437.5 or 438		A1ft	www 2
	art 2.1 $\times 10^3$		B2ft	their 437.5×4.8 in s.f., B1ft for art '2 100'
	art 2.1 $\times 10^9$ o.e		B1ft	their (c) $\times 10^6$ correct. Accept art 2 100 000 000
				Accept standard form answers correct to 2 sf
	$\pi \times 0.2^2 \times 500$		M1	
	62.8 to 62.84	cao	A1	www 2
	their (b) $-$ their (e)		M1	Provided positive answer
$\frac{\text{their}(b) - \text{their}(e)}{\text{their}(b)} \times 100$ o.e.		M1	dep	
85.6 to 85.7	cao	A1	www 3 After M0, SC1 for 14.3 to 14.4	
			12	

Volume/Surface Area 1 (Oct 04 Paper 4, Qu. 6 and May 06 Paper 4 Qu. 2)

Q6(a)(i)	$\frac{2 \times \pi \times 7^3}{3} + \frac{\pi \times 7^2 \times 13}{3}$ 1384.7 to 1386 or 1380 or 1390 (cm³)	M1	
		A1	www2
(ii)	their(a)(i) x 0.94 1.3 (kg)	M1	$\sqrt{\text{ft } \frac{\text{their(a)(i)} \times 0.94}{1000}}$
		A2 √	www3 If A2 not scored, allow A1 √ for 1.30...
(b)	(L =) $\sqrt{13^2 + 7^2}$ $\pi \times 7 \times \text{theirL}$ 324 to 326 (cm²)	M1	Implied by $\sqrt{218}$ or 14.7..... or 14.8
		M1	Dep. on first M1.
		A1	www3
(c)	CSA of hemisphere = $2 \times \pi \times 7^2$ s.o.i. their(b) + their CSA 631.7 to 634 411.58 s.o.i. their total (\$)<u>0.649 to 0.652 or 64.9 to 65.2 cents</u>	M1	307.7 to 308 if no working
		M1	Dep. on first M1
		A1	Seen or implied by subsequent working.
		M1	Dep. on a total
		A1	www5
			13
			NB M1M1A0M1A1 is not possible.

2 (a)	Arc length = $\frac{\pi \times 24}{4}$ (18.8...)	M1	
	Perimeter = 6 + 22 + 18 + 10 + their arc 74.8 to 74.9 (cm)	M1	
		A1	
(b)	Sector area = $\frac{\pi \times 12^2}{4}$ (113. ...)	M1	
	Area = (6 x 22) + (12 x 10) + their sector o.e.	M1	
	365 to 365.2 (cm²)	A1	
(c)	14600 to 14605 (cm³)	B1	
(d)	their (b) x 2	M1	indep.
	their (a) x 40	M1	indep.
	Addition	M1	dep.
	3720 to 3730 (cm²)	A1	
			11

Volume/Surface Area 2 (Oct 01 Paper 4 Qu. 7)

7	(a)	(i)	$(2\pi \cdot 3^3)/3$ $\pi 3^2 \cdot 7$ $(\pi 3^2 \cdot 4)/3$ 292 to 293 (cm ³)	M1 M1 M1 A1	Implied by 56.5 or 56.6 Implied by 197.8 to 198 Implied by 37.6 to 37.8 w.w.w.4 Accept 93π Allow SC1 for 348-349 after M0 for $\frac{4}{3}\pi \cdot 3^3$ (113)	4
		(ii)	Slant height $\ell = 5\text{cm}$ $2\pi \cdot 3^2$ $2\pi \cdot 3 \cdot 7$ $\pi \cdot 3 \cdot (\text{their } \ell)$ 235 to 236 (cm ²)	B1 M1 M1 M1 A1	Implied by 56.5 to 56.6 Implied by 131.8 to 132 Any ℓ except 4. Implied by 47.1 to 47.2 w.w.w.5 Accept 75π Allow SC1 for 292 - 293 after M0 for $4\pi 3^2$ (113)	5
	(b)	(i)	$(2\pi x^2)/3 + \pi x^3 + (\pi x^3)/3$	M3	M1 each part and i.s.w.	
		(ii)	785 to 786 (cm ³)	B1	Accept 250π. Allow SC1 for 1047-1048 after $\frac{4\pi x^3}{3}$	4
	(c)		Any $a : b : c$ where $a = b + c$ Anything : $3k : k$ 4 : 3 : 1	M1 M1 A1	Any k	3
						16

area of a circle

17	a) $16\pi r^2$ oe as final answer b) $15\pi r^2$ oe as final answer c) $10\pi r$ oe as final answer (single term)	B1 B1 B2	accept 50.2 to 50.3 for 16π accept 47.1 to 47.2 for 15π accept 31.4(...)r M1 for $2\pi r + 2\pi(4r)$ oe SC2 for all three answers correct	
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circle arc/area of sectors/ volume

8(a)(i)	$\pi \cdot 6^2$ used 6.28 (cm ²)	M1 A1	ww2
(ii)	$2\pi \cdot 6$ used 2.09 (cm)	M1 A1 ₍₄₎	ww2. After 0/4 allow Sc1 for 20/360 seen
*(b)(i)	5 × their sector area 31.4 (cm ³) or 31.5 cm ³	M1 A1 ✓	✓ 5 × (their(a)(i)),
(ii)	2 × their sector area (12.56)	M1	
	5 × their arc length (10.47)	M1	
	2 × 6 × 5 (60)	M1	
	83 ^(.1) _(.0) (cm ²)	A1 ₍₆₎	www4
(c)(i)	D	B2	
(ii)	Height is $h/4$ o.e. Accept h = 1.25 cm	B2 (4)	Allow Sc1 for "height less" o.e. (accept 1/2)

Area of a sector/volume

6 (a)	$\pi(30)^2 (50)$ 141 000 (cm ³)	M1		
		A1	(141 300 to 141 430)	www2
		(2)		
(b) (i)	18 (cm)	B1		
(ii)	$\cos\left(\frac{1}{2}\angle AOB\right) = (\text{their } 18)/30$ x2 $\angle AOB = 106.26^\circ$ c.a.o	M1	Allow M1 or M2 at similar stages for other methods e.g. $\sin A = 18/30$ then $(180^\circ - 2A)$	
		M1dep		
		A1	Must have 2 decimal places seen. ww1 (condone = 106.3 afterwards)	
		(4)		
(c) (i)	(their) $\frac{106.3}{360}$ used $\pi(30)^2$ used 834 to 835.3 (cm ²)	M1		
(ii)	$\frac{1}{2} \cdot 30 \cdot 30 \sin(\text{their } 106.3^\circ)$ or $\frac{1}{2} \cdot 48.18$ 431.8 to 432 (cm ²)	M1		
(iii)	Ans. Rounds to 403 cm ²	A1	www3	
		M1		
		A1	www2	
		(6)		
(d) (i)	50 x (their) 403	M1		
**	20 100 to 20 200 (cm ³)	A1√	√ correct for their "403"	www2
** (ii)	20.1 to 20.2 (litres)	B1√	√ their previous answer + 1000	
		(3)		
(e)	$k\left[\frac{1}{2}\text{their (a)} - \text{their (d) (i)}\right]$ 50.3 to 51 (litres)	M1	$k = 1$ (cm ³) $k = .001$ (litres) $k = \text{other} \Rightarrow$ consistent conversion error.	
		A1	Marking final answer	www2
		(2)		

circle problems arc/trig

2	(a)	$2\pi \times 63.7$ (400....)	M1	Any k	3
		$k \times \frac{46}{360}$ (0.1277...) or $\frac{k}{7.826}$ o.e.	M1		
		Answer in range 51.1 to 51.2 (cm)	A1	w.w.w.3 w.w.51 \Rightarrow M2A0	
	(b)	$63.7 \sin 23^\circ$	M1	Or $AB^2 = 63.7^2 + 63.7^2 - 2(63.7)^2 \cos 46^\circ$ or implicit or $\sqrt{(2477.96)}$ or explicit	3
		2 x above	M1		
		Answer in range 49.7 to 49.8 (cm)	A1	w.w.w.3	
	(c)	$63.7 \cos 23^\circ$ o.e.	M1	or $63.7^2 \sin 46^\circ \div$ their b i.e. a complete, explicit method, e.g. $\sqrt{63.7^2 - \left(\frac{b}{2}\right)^2}$ or $\frac{b}{2} \div (\tan 23)$	2
		Answer in range 58.6 to 58.7 (cm)	A1		
	(d)	$63.7 -$ (their) 58.6 cm	M1	Allow 63.75 - their minimum (c) w.w.w.2 $\sqrt{\text{Not } 51.0 \text{ mm}}$ Must be to nearest mm. More accuracy A0	2
		5.1 cm or 51 mm \checkmark	A1 \checkmark		
					10