

Mensuration P4 Answers

1)	(a)	4.53 or 4.526 – 4.530....	3	SC2 for figs 453 or 4526 – 4530 If SC0, M1 for $\pi \times (\text{figs } 31)^2 \times 15$
	(b)	3.62 to 3.624 ft	2ft	M1 for their (a) \times figs 8 oe
	(c) (i)	$360 - 2 \times 90 - 60$ oe	2	E2 The 90's and the 60 must be clearly justified. Accept in diagram. SC1 for 60 or two 90's so in correct positions oe e.g $360 \div 3$ scores 0
	(ii)	0.649 (0.6492 to 0.6493)	2	M1 for $\pi \times$ figs $62 \div 3$
	(iii)	7.53 (7.527 or 7.528....)	3	M1 for their (ii) $\times 3$ M1 (indep) for $18 \times$ figs 31 This M is spoiled by extra lengths.
	(iv)	112.9 to 113 ft	1ft	ft their (iii) $\times 15$
2)	(a)	$\frac{4}{3}\pi \times 2.4^3$ 57.87 – 57.92 to at least 4 figures	M1 A1	Must see method
	(b) (i)	14.4, 9.6, 4.8	1, 1, 1	Any order
	(ii)	664 (663.5 – 663.6) ft	1ft	
	(iii)	315 or 316 or 317 (315.2 – 316.8) ft	1ft	ft their (b)(ii) $- 6 \times '57.9'$ (only if positive)
	(iv)	507 (506.8 – 506.9) ft	2ft	M1 for $(14.4 \times 9.6 + 14.4 \times 4.8 + 9.6 \times 4.8) \times 2$ or their 3 lengths.
	(c) (i)	Height seen or implied as 6×4.8 or better $\pi \times 2.4^2 \times$ their height 521 (520.8 – 521.3) www 3	M1 M1 A1	Indep
	(ii)	174 or 173 (173.2 – 174.1) ft	1ft	ft their (c)(i) $- 6 \times '57.9'$ only if positive
	(iii)	470 – 471 cao www 3	3	M1 for $2 \times \pi \times 2.4^2$ (36.17 to 36.2), and M1 indep for $\pi \times 4.8 \times$ their height from (c)(i)

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3)	(a)	$40 \div 10$ and $12 \div 6$ (or $12 \div 3$) and $6 \div 3$ (or $6 \div 6$) oe $4 \times 2 \times 2 = 16$ reducing (seen) to 16	E2	M1 Allow drawing for M1 but must see reaching 16 for E2 Reaching 16 without any errors or omissions SC1 for $\frac{40 \times 12 \times 6}{\text{their (b)}}$ even if = 16 or $4 \times 2 \times 2 = 16$ or $4 \times 4 \times 1 = 16$ without other working
	(b)	180	1	
	(c) (i)	23 640 (allow 23 600)	2	M1 for their $180 \times 8 \times 16 + 600$
	(ii)	23.64 (or 23.6) ft	1ft	ft their (i) $\div 1000$
	(d) (i)	216	2	M1 for $(10 \times 6 + 10 \times 3 + 6 \times 3) \times 2$ oe
	(ii)	8.64	3	M1 for their (i) $\times 16 \times 25$ M1 (indep) for $\div 100^2$ Figs 864 imply M1 only
	(e)	75.3 (75.26 to 75.33....)	3	M1 for $\frac{4}{3}\pi \times 0.5^3$ (0.5235..) Implied also by 104.7.... then M1 (dep) for their (b) $- 200 \times$ their $\frac{4}{3}\pi \times 0.5^3$ must be giving positive answer
	(f)	0.842 (0.8419 – 0.8421)	3	M1 for $(\frac{4}{3}\pi r^3) = 50 \div 20$ then M1 for $\frac{50 \div 20}{\frac{4}{3}\pi}$ (0.5966 to 0.5972) After 0 scored SC1 for $\sqrt[3]{\frac{50}{\frac{4}{3}\pi}}$ (implied by 2.29)

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6)

(a) (i) $2.7 \times \frac{20}{12}$ oe = 4.5	E2	M1 for (SF \Rightarrow) 20/12 or 12/20 (but not from 2.7/4.5 or 4.5/2.7)
(ii) $\frac{1}{3}\pi \times 4.5^2 \times 20 - \frac{1}{3}\pi \times 2.7^2 \times 12$ or $(1 - (3/5)^3) \times \frac{1}{3}\pi \times 4.5^2 \times 20$ oe 332.3 to 332.6 or 332 or 333	M3 A1	M1 for $\frac{1}{3}\pi \times 4.5^2 \times 20$ (424 ... or 135π) and M1 for $\frac{1}{3}\pi \times 2.7^2 \times 12$ (91.6...or 29.16π)
(b) (i) $8^2 + (4.5 - 2.7)^2$ oe sq root 8.2	M1 M1 E1	e.g. Alt: $20^2 + 4.5^2$ and $12^2 + 2.7^2$ Dep on 1st M1 Alt: $20.5 - 12.3$ Other complete correct methods are M2 No errors seen
(ii) 185 or 186 or 185.5 or 185.45 to 185.51	5	M4 for $\pi \times 4.5 \times 20.5 - \pi \times 2.7 \times 12.3$ or other complete correct method or M3 for $\pi \times 4.5 \times 20.5$ or $\pi \times 2.7 \times 12.3$ (290 or 92.25π) (104.3...or 33.21π) or B2 for (slant height of large cone \Rightarrow) 20.5 or (slant height of removed cone \Rightarrow) 12.3 or M1 for $\sqrt{4.5^2 + 20^2}$ or $\sqrt{2.7^2 + 12^2}$ or $12/8 \times 8.2$ oe or $20/8 \times 8.2$ oe

7)

(a)	$250x^2 = 4840$ o.e. $x^2 = 19.36$ or $(x \Rightarrow) \sqrt{4840 \div 250}$ (= 4.4)	M1 E1	Allow M1 for $250 \times 4.4^2 = 4840$ Then E1 for $250 \times 19.36 = 4840$
(b)	42.6 (kg) cao (42.592 or 42.59)	B2	SC1 for figures 426 or 4259...
(c)	26.4 (cm) c.a.o.	B2	If B0 , M1 for any of following $88 \div 4.4 = 20$ and $120 \div 20 = 6$ (accept 6 bars high o.e.) or $88h = 4.4^2 \times 120$ or $250 \times 88 \times h = 120 \times 4840$
(d) (i)	$4840 \div 4200$ (implied by 1.15(2)) $\div \frac{4}{3}\pi$ (implied by 0.274 to 0.276) $\sqrt[3]{\quad}$ (seen or implied by correct answer to more than 2 dp) 0.649 – 0.651	M1 M1 M1 dep A1	$4200 \times \frac{4}{3}\pi r^3 = 4840$ ($r^3 \Rightarrow$) $4840 \div (4200 \times \frac{4}{3}\pi)$ $\sqrt[3]{\quad}$ Third M dependent on M1M1 Must be 3dp or better
(ii)	5.31 (5.306 – 5.31) (cm ²)	B1	
(iii)	$\frac{4200 \times \text{their (ii)}}{2 \times 4.4^2 + 4 \times 4.4 \times 250} \times 100$ 501.9 – 503 (%) c.a.o. www4	M3 A1	If M0 , M1 for $4200 \times \text{their (ii)}$ (22299) and M1 (independent) for correct method for surface area of solid cuboid (4438.72)

[15]