

1	$4 \times 4 \times 4 (= 64)$ or $60 \times 48 \times 40 (= 115\,200)$ OR $60 \div 4 (= 15), 48 \div 4 (= 12), 40 \div 4 (= 10)$ oe “115 200” \div “64” or “15” \times “12” \times “10”		3	M1	for finding the volume of either the cube or carton OR finding the number of cartons that fit along each edge of the box
		1800		M1	for a complete method
				A1	
Total 3 marks					

2	$\pi \times 3^2 \times h = 72\pi$ oe		5	M1	Allow use of 3.14... or $\frac{22}{7}$ for π and use of 226... for 72π
	$h = 72\pi \div (\pi \times 3^2)$ oe or $h = 8$			M1	method to isolate h (may be seen in several stages)
	$2 \times \pi \times 3^2 (= 18\pi$ or 56.54...) or $2 \times \pi \times 3 \times "8"$ oe ($= 48\pi$ or 150 - 151)			M1	method to find the area of the two circles or curved surface area – use of their h , dep on M1 (NB may get this mark for area of 2 circles with no previous marks awarded)
	$2 \times \pi \times 3^2 + 2 \times \pi \times 3 \times "8"$ oe ($= 66\pi$)			M1	complete method to find the total surface area ft their h dep on 1st M1, including intention to add, to find the total surface area
		207		A1	accept 207-208
Total 5 marks					

3	$11.2^2 - 7.4^2 (= 70.68)$ or $[x =] \cos^{-1} \left(\frac{7.4}{11.2} \right) (= 48.64...)$ or $[y =] \sin^{-1} \left(\frac{7.4}{11.2} \right) (= 41.35...)$ or $\sin^{-1} \left(\frac{7.4 \sin 90}{11.2} \right)$		5	M1	A correct first stage to finding the perpendicular height of the triangular cross section
	eg $\sqrt{11.2^2 - 7.4^2} (= 8.407...)$ or $[h =] \sin "48.64..." \times 11.2$ or $\tan "48.64..." \times 7.4 (= 8.407...)$ or $[h =] \cos "41.35..." \times 11.2$ or $\frac{7.4}{\tan "41.35..."}$ ($= 8.407...$)			M1	oe eg $h = \frac{11.2 \sin "48.64..."}{\sin 90}$
	eg $7.4 \times "8.407" \div 2 (= 31.10...)$ or $7.4 \times "8.407" \times 15 (= 933.19...)$			M1	for method to find area of cross section or volume of cuboid
	eg “31.10” $\times 15 (= 466.59...)$ or “933.19” $\div 2 (= 466.59...)$			M1	complete method to find volume of the prism
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	467		A1	accept 466 – 467 SCB2 (if M0 awarded) for $0.5 \times 7.4 \times \sqrt{11.2^2 + 7.4^2} \times 15 (= 745)$ or SCB1 (if M0 awarded) for $7.4 \times \sqrt{11.2^2 + 7.4^2} \times 15 (= 1490)$ or $0.5 \times 7.4 \times \sqrt{11.2^2 + 7.4^2} (49.6...)$ or $0.5 \times 7.4 \times 11.2 \times 15 (= 621.6)$ or 622
Total 5 marks					

4	a	$(x =) 270 \div (12 \times 5) (= 4.5)$ oe $\pi \times '4.5'^2 \times 2 \times '4.5' (= 182.25\pi)$ oe	3	M1	
		573		M1	ft dep on M1
				A1	accept 572 – 573
	b	1 000 000	1	B1	or $(1 \times) 10^6$ or (one or 1) million oe
Total 4 marks					

5		e.g. $30 \times 20 \times 125 (= 75\,000)$ or $85 \times 40 \times 125 (= 425\,000)$ or $(60 \times 30 + (85 - 30) \times 40) \times 125 (= 500\,000)$ oe		4	M1 for a method to find the volume of water already pumped out or the volume of water left or the total volume of the container
		"75 000" \div 1.5 (= 50 000) or "75 000" \div 90 (= 833.3... or $\frac{2500}{3}$) or "425000" \div "75000" (= 5.66... or $\frac{17}{3}$) or "500000" \div "75000" (= 6.66... or $\frac{20}{3}$)			M1 M2 for $\frac{"425000"}{"75000"} \times 1.5$ oe (= 8.5) or $\frac{"500000"}{"75000"} \times 1.5$ oe (= 10)
		"425 000" \div "50 000" (= 8.5) or "425 000" \div ("833.3..." \times 60) oe (= 8.5) or "5.66..." \times 1.5 (= 8.5) or "6.66..." \times 1.5 (= 10)			M1
			20 30		A1 Allow 8 30 (pm)
Total 4 marks					

6	(b)	$15.5 \times 8 (= 124)$ or $15.5 \times 8 \times x$ $15.5 \times 8 \times x = 806$ $806 \div "124"$	6.5	3	M1 M1 dep A1
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7		$65 \times 35 \times 45 (= 102\,375)$ and $5 \times 5 \times 5 (= 125)$ or ($65 \div 5$) (= 13), ($35 \div 5$) (= 7) and ($45 \div 5$) (= 9)		3	M1
		'102 375' \div '125' or '13' \times '7' \times '9'			M1
			819		A1
Total 3 marks					

8		two of: $60 \div 8 (= 7.5)$ or 7 $20 \div 8 (= 2.5)$ or 2 $24 \div 8 (= 3)$		5	M1 at least two divisions to find number of cartons for l or w or h . Could be written on sides of box
		"7" \times "2" \times "3" (= 42) or "7" \times 8 (= 56) and "2" \times 8 (= 16) and "3" \times 8 (= 24)			M1 correct method to find the number of cartons that fit or finding the dimensions of the occupied space
		$60 \times 24 \times 20 (= 28\,800)$ or $8 \times 8 \times 8 (= 512)$ or (7×8) \times (2×8) \times (3×8) (= 21 504) oe eg $56 \times 16 \times 24 (= 21\,504)$			M1 method to work out volume of either B or C
		"28 800" – "42" \times "512" or "28 800" – "21504"			M1 complete method to find volume of packing material.
			7296		A1 allow 7300 from correct working
					If no marks scored SC B3 for $60 \times 24 \times 20 - "56" \times 8 \times 8 \times 8$ (= 128)
8 Alt Finding space left		two of $7 \times 8 (= 56)$, $3 \times 8 (= 24)$, $2 \times 8 (= 16)$ or two of $60 - 56 (= 4)$, $20 - 16 (= 4)$, $24 - 24 (= 0)$		5	M1 two lengths of filled space found or two lengths of empty space found.
		"4" \times $24 \times 20 (= 1920)$ or "4" \times $24 \times 60 (= 5760)$ or "4" \times "4" \times 24 (= 384) or or "4" \times $24 \times "16" (= 1536)$ or "4" \times $24 \times "56" (= 5376)$			M1 at least one correct product seen
					M1 at least two correct products seen
		eg "1920" + "5760" – "384" or "1536" + "384" + "5376" or "5760" + "1536" or "1920" + "5376" oe			M1 complete method to find volume of packing material.
			7296		A1
Total 5 marks					

9	$2.4 \div 0.4 (= 6)$ or $240 \div 40 (= 6)$ or $10 \div 0.4 (= 25)$ or $1000 \div 40 (= 25)$ or $40 \times 40 \times 40 (= 64\,000)$ or $0.4 \times 0.4 \times 0.4 (= 0.064)$ or $1000 \times 240 \times 240 (= 57\,600\,000)$ or $10 \times 2.4 \times 2.4 (= 57.6)$ oe		3	M1 could show the number of boxes along the edge of a container – award marks if this is unambiguous.
	“6” \times “6” \times “25” oe or “57 600 000” \div “64 000” or “57.6” \div “0.064” oe			M1 fully correct method to find greatest number of boxes
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	900		A1
Total 3 marks				

10			3	M1 For area of 2 different faces (ie not 2 triangles)
	$0.5 \times 4.8 \times 3.6 (= 8.64)$ oe or 4.8×3.6 if clear intention for this to be 2 triangles $7 \times 3.6 (= 25.2)$ $7 \times 4.8 (= 33.6)$ $7 \times 6 (= 42)$ (all measurements with intention to add)			M1 For adding together 5 areas, at least 4 of which are correct NB: $(3.6 + 4.8 + 6) \times 7 (= 100.8)$ is 3 faces
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	118		A1 118.1 or 118.08
Total 3 marks				

11	eg $\pi \times 3^2 \times 7 (= 63\pi$ or $197.9\dots)$		3	M1 for method to find the volume of Solid A
	eg $\frac{2000}{[\text{vol A}]}$ or $\frac{3375}{450} (= 7.5)$ oe or $\frac{2000 + 3375}{[\text{vol A}] + 450}$			M1 (indep) for method to find the density of Solid A , B or C , allow use of their volume for Solids A and C
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	8.3		A1 accept 8.29 – 8.31
Total 3 marks				

12	eg $6 \times 14 (= 84)$ or $13.5 \times 14 (= 189)$ or $7.5 \times x (= 7.5x)$ or $924 \div 8 (= 115.5)$ or any correct calculation that leads to an area linked to the cross section of the shape	eg $14 \times 6 \times 8 (= 672)$ or $7.5 \times x \times 8 (= 60x)$ or $13.5 \times 14 \times 8 (= 1512)$ any correct calculation that leads to a volume linked to the 3D shape		4	M1 a correct calculation linked to the area of the cross section of the shape – can be numerical or algebraic and maybe part of another calculation. or a correct calculation linked to the volume of the shape – can be numerical or algebraic and may be part of another calculation
	$\frac{924}{8} - 84 (= 115.5 - 84 = 31.5)$ oe or $6 \times 14 + 7.5x = “115.5”$ oe	$\frac{924 - “672”}{8} (= \frac{252}{8} = 31.5)$ or $\frac{924 - “672”}{7.5} (= \frac{252}{7.5} = 33.6)$ or $8(6 \times 14 + 7.5x) = 924$ oe			M1 a calculation that leads to a value one step away from the value of x eg a calculation leading to 31.5 (one step remains which is to divide by 7.5) or a correct equation in x
	eg $(\frac{924}{8} - “84”) \div 7.5 (= 31.5 \div 7.5)$ or $\frac{“115.5” - “84”}{7.5}$ oe or “33.6” $\div 8$				M1 a fully correct calculation that leads to the value for x
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	4.2			A1oe

13	$\sin 32 = \frac{(BC)}{50}$ or $\cos 32 = \frac{(CD)}{50}$ or $\frac{(BC)}{\sin 32} = \frac{50}{\sin 90}$ oe or $\frac{(CD)}{\sin(90-32)} = \frac{50}{\sin 90}$ oe		6	M1
	$(BC =) 50 \sin 32 (= 26.4(959...))$ or $(BC =) \sqrt{50^2 - (50 \cos 32)^2} (= 26.4(959...))$ or $(BC =) \sqrt{50^2 - "42.4..."^2} (= 26.4(998...))$ or $(BC =) \frac{50}{\sin 90} \times \sin 32$ oe			M1 for finding BC or AD Can be written on the diagram
	$(CD =) 50 \cos 32 (= 42.4(024...))$ or $(CD =) \sqrt{50^2 - (50 \sin 32)^2} (= 42.4(024...))$ or $(CD =) \sqrt{50^2 - "26.4..."^2} (= 42.4(622...))$ or $(CD =) \frac{50}{\sin 90} \times \sin(90-32)$			M1 for finding CD or BA Can be written on the diagram
	$(r =) "42.4(024...)" \div 2\pi (= 6.74(855...))$			M1 for finding the radius of the cylinder
	$(V =) \pi \times "6.74(855...)"^2 \times "26.4(959...)"$			M1 dep on previous M mark for the use of $\pi r^2 h$
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	3790		A1 allow answers in the range 3737 – 3794 Accept answers in standard form
Total 6 marks				

14	(b)	$231 \div (7 \times 6)$ or $7 \times 6 \times w = 231$ oe		2	M1 for a complete method to find the value of w or for setting up an equation for the volume of the cuboid
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	5.5		A1 oe $\frac{11}{2}, 5\frac{1}{2}$