

MEASUREMENT MARKING SCHEME

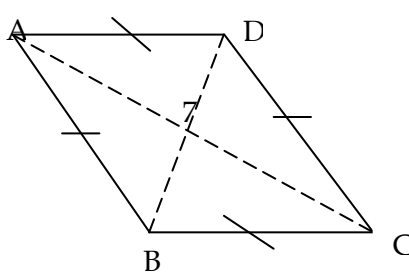
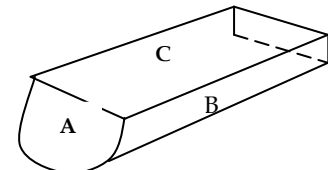
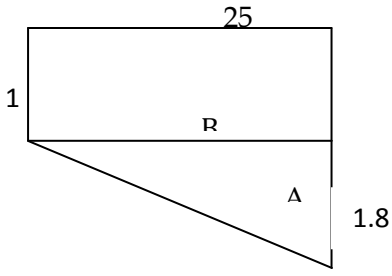
1.	$2.4\text{m} - 1.8\text{m} = 0.6\text{m}$ $3.2 \times 0.6\text{m} \times 2 = 3.84\text{m}^2$ $2.8\text{m} \times 0.6\text{m} \times 2 = 3.36\text{m}^2$ $3.8\text{m} \times 0.6\text{m} \times 2 = 3.3\text{m}^2$ $3.84\text{m}^2 + 3.36\text{m}^2$ $= 7.20\text{m}^2$ <p style="text-align: right;">1989Q9</p>	2M	
2.	$V = \pi r^2 h + \frac{2}{3} \pi r^3$ $= \left(\frac{22}{7} \times 7^2 \times 15 \right)$ $+ \left(\frac{2}{3} \times \frac{22}{7} \times 7^3 \right)$ $= 2310 + 718.67\text{cm}^3$ $= 3,028.67\text{cm}^3$ <p style="text-align: right;">1989Q16</p>	4M	
3.	$A = \frac{\theta}{360} \pi r^2$ $30.8 = \frac{72}{360} \times \frac{22}{7} \times r^2$ $r^2 = \frac{30.8 \times 360 \times 7}{72 \times 22}$ $r^2 = \frac{77616}{1584}$ $r^2 = 49$ $r = 7$ $AB = \frac{72}{360} \times \frac{22}{7} \times 7 \times 7$ $= 8.8\text{cm}$ <p style="text-align: right;">1990Q9</p>	3M	
4.	$20\text{cm} - 8\text{cm} = 12\text{cm}$ $20^2 - 12^2 = 400 - 144$ $= 256$ $\sqrt{256} = 16\text{cm}$ 16×2 $= 32\text{cm}$ <p style="text-align: right;">1990Q11</p>	3M	
5.	$\frac{a}{\sin A} = \frac{B}{\sin B}$ $\frac{6}{\sin 30} = \frac{x}{\sin 120}$ $x = \frac{6}{\sin 30} \times \sin 120$ $= 10.392\text{cm}$ <p style="text-align: right;">1990Q14</p>	2M	
6.	$V = \pi r^2$ $\frac{22}{7} \times (2.5)^2 \times 14$ $= 275\text{cm}^3$ $\left(\frac{22}{7} \times 4 \times 0.3 \right) - \left(\frac{22}{7} \times \left(\frac{3}{4} \right)^2 \times 0.3 \right)$ $\frac{26.4}{7} - \frac{3.7125}{7} = \frac{22.6875}{7}$ $x = \frac{275 \times 7}{22.6875}$ $= 84.8$ $= 84$ <p style="text-align: right;">1990Q13</p>	4M	
7.	$A = \pi r l$ $\left(\frac{22}{7} \times 20 \times 5.2 \right) - \left(\frac{22}{7} \times 10 \times 26 \right)$ $\frac{22880}{7} - \frac{5720}{7}$ $\frac{17160}{7}$ $2451.42\text{cm}^2 \text{ or } 2450.76\text{cm}^2$ <p style="text-align: right;">1991Q12</p>	3M	
8.	$V = \frac{2}{3} \pi r^3$ $\frac{2}{3} \times \frac{22}{7} \times 7^3$ $\frac{2156\text{cm}^3}{3}$ $\frac{40 \times 1000}{17.5} = 2285.7142\text{cm}^3$ $2285.7142 - \frac{2156}{3} = 1567$ $1567 = \frac{22}{7} \times 7^2 \times h$ $h = \frac{1567 \times 7}{49 \times 22}$ $h = 10.18\text{cm}$ <p style="text-align: right;">1991Q17</p>	8M	
9.	$A = 2ab \sin \theta$ $= 2 \times 20 \times 28.8 \times \sin 62$ $= 154.3\text{cm}^2$ <p style="text-align: right;">1992Q4</p>	3M	

10.	$A = \left(\frac{90}{360} \times 14 \times 4^2\right) - \left(\frac{1}{2} \times 4 \times 4\right)$ $12.56 - 8 = 4.56$ 4.56×2 $= 9.12\text{cm}^2$ <p style="text-align: right;">1992Q15</p>	4M
11.	<p>(a) $\text{vol} = \{(7.5 \times 3.3) - (7.2 \times 5)\} 3.3$</p> $= \{39.75 - 36.0\} 3.3$ $= 3.75 \times 3.3$ $= 12.375\text{m}^3$ <p>Vol required = $12.375 - 5$</p> $= 7.375\text{m}^3$ <p>(b) Vol of blocks = $7.375 - 0.225$</p> $= 7.15\text{m}^3$ <p>No of blocks = $\frac{7.15}{0.0135} = 529.6$</p> $= 530 \text{ blocks}$ <p style="text-align: right;">1992Q17</p>	8M
12.	<p>(i) $\frac{0.4}{14.4} = \frac{4}{10} \times \frac{10}{144} = \frac{4}{144}$</p> $\text{l.s.f} = \sqrt{\frac{4}{144}}$ $\frac{2}{122} \times 2.1 = 0.35\text{m}$ <p>(ii) $\text{V.S.F} = \left(\frac{2}{12}\right)^3 = \frac{8}{1728}$</p> $\frac{1728 \times 23.15}{8}$ $= 5000\text{litres}$ <p style="text-align: right;">1992Q22</p>	4M
13.	<p>(a) $V = (L \times W \times H) + \left(\frac{1}{2} b \times h \times l\right)$</p> $= (30 \times 14 \times 1) + \left(\frac{1}{2} \times 3 \times 30 \times 14\right)$ $= (420 + 630)$ $= 1050\text{cm}^3$ <p>(b) vol drained per second</p> $= 3.14 \times 72 \times 500$ $= 76930\text{cm}^3$ <p>$\frac{1050 \times 100000}{76930} = 13648.77\text{seconds}$</p> $\frac{13648.77}{60} = 227\text{minutes}$ <p style="text-align: right;">1992Q20</p>	4M
14.	$V = (l \times w \times h) + \pi r^2 h$ $(21 \times 30 \times 40) + \left[\frac{22}{7} \times (10.5)^2 \times 40\right]$ $25200 + 13860$ $= 39060\text{mm}^3$ $\frac{39060}{1000} = 39.06\text{cm}^3$ <p>Mass = 39.06×8.8</p> $= 343.7\text{g}$ <p style="text-align: right;">1993Q7</p>	4M
15.	$\text{V.S.F} = \left(\frac{1}{3}\right)^3 = \frac{1}{27}$ $\frac{27}{27} - \frac{1}{27}$ $= \frac{26}{27}$ <p style="text-align: right;">1993Q15</p>	3M
16.	$V = \pi r^2 H + \frac{2}{3} \pi r^3$ $\left(\frac{22}{7} \times 1.75^2 \times 5\right) + \left(\frac{2}{3} \times \frac{22}{7} \times 1.75^3\right)$ $\frac{336.875}{7} + \frac{1086.624}{7} = \frac{1423.499}{7}$ $= 203.357$ $= 203.4\text{cm}^3$ <p style="text-align: right;">1993Q3</p>	3M
17.	$V = A \times h$ $A = \sqrt{s(s-a)(s-b)(s-c)}$ $= \sqrt{4.5 \times 1.5 \times 1.5 \times 1.5}$ $= \sqrt{15.1875} = 3.8971143$ <p>$v = 3.8971143$</p> $= 97.43\text{cm}^3$ <p style="text-align: right;">1995Q4</p>	
19.	$\pi r^2 h = \frac{4}{3} \pi r^3$ $\pi \times 11^2 \times 50 = \frac{4}{3} \pi r^3$ $R^3 = \frac{6050\pi \times 3}{4\pi}$ $r = 4537.5$ $r = 16.5\text{cm}$ $r = 16.56\text{cm}$ <p style="text-align: right;">1995Q14</p>	2M
20.	$1 + x^2 = (2x -)^2 - 1$ $3x^2 - 4x - 1 = 0$ $x = \frac{4 \pm \sqrt{28}}{6}$ $= 1.549$ <p style="text-align: right;">1996Q7</p>	M1 M1 M1 A 1

21.	<p>Volume of the cone $= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 18$ $= 924\text{cm}^3$ Let change in height be h Volume of water displaced $= \frac{22}{7} \times 14 \times 14 \times h$ $= 616\text{cm}^2$ $\pi \times 14 \times 14 \times h = \frac{1}{3} \pi \times 7 \times 7 \times 18$ $H = \frac{49 \times 6}{14 \times 14} = 1.5$</p> <p style="text-align: right;">1997Q6</p>	M1 M1 M1 A1 4 M	25. Initial volume = $\frac{4}{3\pi r^3} \times 2^3 = \frac{3211}{3}$ New vol = $32 \pi \times 337.5$ $= 36 \pi$ <p style="text-align: right;">1998Q11</p>	M1 M1 2M
22.	<p>i). Area of equid. $\Delta = \frac{1}{2} \times 6 \times \sin 60^\circ$ $= \frac{1}{2} \times 6 \times 0.8669$ $= 15.588 (15.59)$ x = section area $= \frac{1}{2} \times 6 \times 6 \times 0.8660 \times 6$ $= 15.59 \times 6$ $= 93.54 (93.528)$ ii). Vol. of prism = 93.54×30 $= 2806.2(2805.9)$</p> <p style="text-align: right;">1997Q16</p>	M1 M1 A1 M1 A1	26. Area = $3.142 \times 5 \times 13$ $= 204.23\text{cm}^2$ If base area included M1 AO <p style="text-align: right;">1999Q4</p>	M1 A1 2 M
23.	<p>Volume = $\pi r^2 h = \pi 15 \times 1.2$ 270π (b) $\frac{1}{3} \pi \times r \times r \times 9 = 270 \pi$ $r^2 = \frac{270 \times 3}{9} = 90$ $r^2 = \sqrt{90} = 10.947$</p> <p style="text-align: right;">1998Q11</p>	M1 A1 M1 A1 3M	27 a). $y^2 - 2x^2 = \text{cm}^2$ b). $2x^2 = 142$ $x = 7\sqrt{2}$ c). area of octagon $y = 14 + 2x = 14 + 2 \times 9.9 = 33.8$ $A = y^2 - 2x^2 = 33.8^2 - 2 \times 98$ $= 1142.44 - 196$ $= 946.44\text{cm}^2$ <p style="text-align: right;">1999Q8</p>	B1 B1 M1 M1 A1
24.	<p>(a) area of the circular based $\frac{22}{7} \times 2 \times 3.5 \times 3.5 = 38.5$ (b) area of the curved S.A $\frac{22}{7} \times 2 \times 3.5 \times 20 = 440\text{cm}^2$ (c) $\frac{4}{3} \pi r^2 = \frac{2}{3} \times \frac{22}{7} \times 3.5^2$ $44 \times 0.5 \times 3.5$ $22 \times 3.5 = 77\text{cm}^2$ (d) $38.5 + 440 + 77\text{cm}^2$</p> <p style="text-align: right;">1998Q21</p>	A1 M1 A1 M1 A1 M1 M1 A1 8M	28. Length of the pipe $\frac{63}{7000} = (0.15 \times 0.12 \times 01)$ $= 0.009 \div 0.006$ $= 1.5\text{m}$ <p style="text-align: right;">1999Q13</p>	M1 M1 M1 A1 4 M
			29. a) volume of hemisphere $\frac{1}{2} \times \frac{4}{3} \times \frac{22}{7} \times 5.2^3$ $10.4 : 10.4 : 11: h - H - 3h$ Big cone $V_1 = \frac{1}{3} \times \frac{22}{7} \times 5.2^2 \times h$ Small cone $V_2 = \frac{1}{3} \times \frac{22}{7} \times (\frac{5.2}{3}) \times h$ $V_1 - V_2 = \frac{1}{2} \times \frac{22}{7} \times 5.2^2 \times (3 - \frac{1}{9}) h$ $= \frac{1}{2} \times \frac{22}{7} \times 5.2^2 \times (\frac{26}{9}) h$ $\frac{26}{9} h = 10.4$ $H = \frac{10.4 \times 9}{26} = 3.6$ Therefore height of the frustum $= 2h = 7.2\text{cm}$	M1 M1 M1 A1

	$b) L = 3.62 + \frac{5.2^2}{3} = 3.995$ $L = \sqrt{10.8^2 + 5.2^2} = 11.98$ $\text{Area} = \pi r^2 + \pi RL - \pi rl$ $\frac{22}{7} \times 3 \times \frac{22}{7} \times 5.2^2 \times \frac{11.98}{7}$ $- \frac{22}{7} \times \frac{5.2}{3} \times 3.995$ $= 9.429 + 195.8 - 21.76$ $= 183.469$ $= 183.5\text{cm}^2 \quad \mathbf{1999Q23}$	M1 M1 A1 8 M
30	Area of rectangle = 19.5 x 16.5cm = 321.75cm ² Area of 4 triangles = $\frac{1}{2} \times 6 \times 4.5 \times 4$ = 54cm ² Area of octagon = 321.75 - 54 = 267.75cm ² 2000Q9	
31	a) i) $A = \frac{22}{7} \times 4.2 \times 4.2 = 5.44\text{cm}^2$ ii) Let standing length cone be L $L - 8 = \frac{3.5}{4.2}$ or equivalent L = 48cm Curved area of frustum $22 (4.2 \times 48 - 3.5 \times 40)$ 193.6cm ² iii) hemispherical surface area = $\frac{1}{2} \times \frac{4}{7} \times \frac{22}{7} \times 3.5 \times 3.5$ = 77cm ² b) Ratio of areas = 81.51 : 326.04 = 1:4 Ratio of lengths = 1 : 2 Radius of base = $\frac{4.2}{2}$ = 2.1cm 200Q20	B1 M1 A1 M1 A1 M1 A1 8 M
32.	$A = \frac{1}{2} \times 5 \times 5 \sin 120^\circ$ = $\frac{1}{2} \times 5 \times 5 \times 0.866$ = 10.825 2000Q3	M1 M1 A1
33.	$x = \frac{p - \pi r}{2}$ Area of triangle = $\frac{1}{2} \frac{(p - \pi r)^2}{2}$ = $\frac{1}{2} (p - \pi r)^2$ Area of semicircle = $\frac{1}{2} \pi r^2$ Total area = $\frac{1}{2} \pi r^2 + \frac{1}{8}(p - \pi r)^2$ 2000Q4	B1 B1 B1 3 M
34	$BO - OD = \sqrt{15^2 - 12^2} = \sqrt{81}$ = 9 AREA = 1 x 9 x 12 x 2 + 1 x '9' x 18 x 2 = 108 + 162 = 270cm ² 2001Q2	M1 M1 A1 3M
35.	$\frac{1}{3} \times \frac{22}{7} \times 6 \times 6 \times 9 + \frac{1}{2} \times \frac{4}{7} \times \frac{22}{7} \times 6 \times 6 \times 6$ = 339.4 + 452.6 = 792 2001 Q4	M1 M1 A1 3 M
36.	Area of pentagons = $\frac{1}{2} \times 4.25 \times 4.25 \sin 72^\circ \times 5 \times 2$ = $\frac{1}{2} \times 4.25 \times 4.25 \times 0.9511 \times 5 \times 2$ = 18.06 x 0.9511 x 5 x 2 = 85.88 or (85.9) Area of rectangle faces = 5 x 12 x 5 = 300 Total area = 300 + 85.88 = 385.88 2001Q12	M1 A1 M1 A1 4 M
37.	a). i). volume cylindrical part = $\frac{22}{7} \times 0.7 \times 0.7 \times 1$ = 1.54m ³ ii). x- section = $\frac{1}{2} \times 0.42 \times \sin 60^\circ \times 6$ = $\frac{1}{2} \times 0.4 \times 0.866 \times 6$ = 0.41568(0.4157) Volume hexagonal part = 0.41568 x 4 = 1.6628 (1.663) b). volume of pillar (1.54+1.6628)-0.25 x 5 = 3.2028 -1.25=1.9528(1.953) =Mass =1.953 x 2400 =4687.2kg(4687kg)	M1 A1 M1 M1 A1 M1 M1 A1 8 M
	2001Q23	

38	$H = 12 \sin 60 = 10.39$ $AD = (12 \cos 60) \times 2 + 4 = 16$ $\text{Area} = \left(\frac{1}{2} \times (4 + 16) \times 10.39\right)$ $= 103.9 \times 2$ $= 207.8 \text{ cm}^2$ 2002Q6	M1 A1 3M
39	$\text{x section area} = \frac{22}{7} (4^2 - 3^2) \text{ cm}^2$ $\text{volume} = \frac{22}{7} \times 7 \times 0.2 \text{ cm}^2$ $4.4 = \text{cm}^2$ 2002Q11	M1 A1 2M
40	$\frac{1}{2} \times 14 \times 8 \sin \theta = 28 \quad \sin \theta = \frac{28}{56} = \frac{1}{2}$ $\theta = 30^\circ \text{ or } 150^\circ$ 2003Q10	M1 A1 2
42	$4x + 2 \left(\frac{3x}{2}\right) = 21$ $7x = 21$ $x = 3$ width is 3cm 2003Q11	
43	a). Ext d = 11cm or $r_1 = 5.5 \text{ cm}$ Int. d = 9cm or $r_2 = 4.5 \text{ cm}$ $\text{Volume} = \pi (r_1^2 - r_2^2) \times 600 \text{ cm}$ $= 3.142 (5^2 - 4.5^2) \times 600 \text{ cm}$ $= 18852.$ 2003Q13	M1 M1 A1 3M
44	a). Volume of milk $\frac{3}{4} (1.7 \text{ m} \times 1.4 \text{ m} \times 2.2 \text{ m})$ $= 3.927 \text{ m}^2$ b). i). Volume of each $\frac{1}{3} \times \frac{1}{2} \times 16 \times 16 \sin 60 \times 13.6$ $= \frac{1}{3} \times \frac{1}{2} \times 256 \times 0.866 \times 13.6$ $= 502.5 \text{ cm}^2$ $\text{in 2sf} = 500 \text{ cm}^3$ ii). Number of full packets	M1 A1 M1 M1 A1 B1
41	$\text{Area } \Delta \text{ face} = \frac{1}{2} \times 6 \times 6 \times \sin 60^\circ$ $= 18 \times 0.866$ $= 15.59$ $\text{Total surface area}$ $= (2 \times 15.59) + 3 \times 6 \times 10$ $= 31.18 + 180$ $= 211.18 \text{ cm}^2$ 2003Q10	M1 M1 M1 A1 2M
	$\frac{3.927}{502.5} \times 10^6 \times 25 = 7814 \times 25$ 502.5 1. $7814 \times 25 = 195350 - 3.927 \times 106$ 502.5 2. $195350 = 7814 \times 25 - 3.926 \log \text{ used}$ 3. $195272 = 7811 \times 15$ - altitude correctly or heroes formula (13.86) 4. $195400 = 7816 \times 25$ - when 502.4 is used 5. 195225 - using 13.86 or heroes formula 3.926 (7809 x 25) 6. $195300 = \frac{3.926}{502.5} \times 10^6 = 7812 \times 25$ 502.5 2003Q17	M1 A1 8M
45.	$\text{S.A} = \frac{1}{2} (4\pi^2) + \pi r^2 \quad 75 \pi$ $r^2 = \frac{75\pi}{3\pi} = 25$ $r = 5$ $v = \frac{1}{2} \left(\frac{4}{3} \pi \times 5^3\right)$ $= 88 \frac{1}{3} \pi$ 2003Q9	M1 A1 M1 A1 4M
46	a) Let $\angle QSE = \theta$ $4^2 = 5^2 + 8^2 - 2 \times 5 \times 8 \cos \theta$	M1

	$\cos\theta = \frac{89-16}{80} = \frac{73}{80} = 0.9125$ $\theta = 24^{\circ} 9'$ $24^{\circ} 8'$ $24^{\circ} 14'$ <p>16.38cm²</p> <p>a) Area of PQS $= \frac{1}{2} \times 8 \times 10 \sin 24^{\circ} 9'$ $= 40 \times 0.4091$ $= 10.825 \text{cm}^2$ $= 16.36 \text{cm}^2$</p> <p style="text-align: right;">2004Q12</p>	A1			
47.	<p>a) Area of hemispherical part $= \frac{1}{2} \times 48r^2$ $= 2 \times \frac{22}{7} \times 35 \times 35$ $= 7700 \text{cm}^2$</p> <p>b) Slant height for original / zone $L = 35$ $L - 60 = 14$ $L = 200 \text{cm}$</p> <p>c) Surface area of frustum $\pi RL = \pi r l$ $N_i = \frac{22}{7} \times 35 \times 100 - \frac{22}{7} \times 14 \times 40$ $= 11000 - 1760$ $= 9240 \text{cm}^2$</p> <p>Total surface area $= 7700 + 9240 + \frac{22}{7} \times 14^2$ $= 7700 + 9240 + 616$ $= 17556 \text{cm}^2$</p> <p style="text-align: right;">2004Q19</p>	M1 A1 M1 A1 M1 M1 A1 M1 M1 A1			
48.	 <p style="text-align: center;">$AD = \sqrt{7.5^2 + 4^2}$</p>	M1 M1			
	$= 72.25$ $= 8.5$ Perimeter = 8.5×4 $= 34 \text{cm}$ <p style="text-align: right;">2005Q19</p>	A1			
49.	 <p>Area A = πr^2 $\frac{22}{7} \times 4.2 \times 4.4$ $= 55.44 \text{cm}^2$</p> <p>Area B = $2\pi r h \times \frac{1}{2}$ $= \frac{22}{7} \times 4.2 \times 150$ $= 1980 \text{cm}^2$</p> <p>Area C = $2 \times 4.2 \times 150$ $= 1260 \text{cm}^2$</p> <p>Total area = $55.44 + 1980 + 1260$ $= 3295.44 \text{cm}^2$</p> <p style="text-align: right;">2005Q3</p>	B1 M1			
50.	<p>Cross sectional area = $\frac{1}{2} bh + 1 \times b$ $= \frac{1}{2} \times 25 \times 1.8 + 25 \times 1 = 47.5 \text{m}^2$</p> <p>Volume = $47.5 \times 10 = 475 \text{m}^3$</p> <p>b). i). volume A $\frac{1}{2} \times 25 \times 1.8 \times 10$ $= 225$</p> <p>Volume B = $10 \times 1 \times 25 = 250$</p> <p>Total volume = $250 + 225 = 475 \text{m}^3$</p>  <p>ii). $225 \text{m}^3 = 9 \text{ hours}$ Therefore $250 \text{m}^3 = \underline{250} \times \underline{9}$</p>	B1 M1 A1 B1 M1 A1			

	<p style="text-align: center;">225 = 10 hours 2005Q19</p>	B2 A1`
51.	<p>a). Height = $\sqrt{3^2 - 1.8^2} = 2.4$ x - sectional area = 9.12cm^3 x - sectional area \times height = $\frac{1}{2} \times 2.4 \times (2+5.6) \times 8$ Volume = 9.12×8 = 72.96cm^3</p> <p>b). Mass mg = 72.96×5.75 = 419.52g</p> <p>c). (i) $246.24 =$ cross section Area $\times 8$ Cross section Area = $\frac{246.24}{30} \times 30.85 \text{ cm}^2$ (ii) $\frac{419.52\text{g}}{246.24 \text{ cm}^2} \times \frac{2}{5} = 4.259 \text{ g/cm}^3$ Area of solution = 9.12×2.25 = 20.52cm^2 2006Q19</p>	M1 M1 A1 M1 A1 M1 A1 10 M
52.	<p>a). Slant height $L = \sqrt{4^2 + 3^2} = 5\text{cm}$ $A_c = \pi r l$ = $3.142 \times 3 \times 5$ = 47.13cm^2 $A_{cs} = \pi D h$ = $3.142 \times 6 \times 8$ = 150.82cm^2 $A_s = \frac{1}{2} 4\pi r^2 = 2\pi r^2$ = $2 \times 3.142 \times 9$ = 56.56 cm^2</p> <p>b). 15cm: 600cm 1:40 a.s.f = $\frac{1}{1600}$</p> <p>Area of container</p>	B1 M1 M1 A1 B1 B1 M1
	<p>1600 x 254.5cm² <u>1600 x 254.5</u> 1000 = 40.72m^2</p> <p>Paint needed <u>40.72</u> x 0.75 20 = 1.527 litres Toal = $24.13 + 9.05 + 2.54\text{ml}$ = 40.73m^2 Paint needed $\frac{40.73}{20} \times 0.75\text{ml}$ = 1.527litres 2006Q23</p>	M1 M1 A1 10 m
53.	<p>Volume of plate = $\frac{1.05}{8.4} \times 100$ = 125cm^3 $L^2 = \frac{125 \text{ cm}}{0.2} = 625$ $L = \sqrt{625} = 25\text{cm}$ 2007Q7</p>	M1 M1 A1 3 M
54.	<p>$\cos \theta = \frac{2.5}{5} = 0.5$ $\theta = 60^\circ \times 2$ surface under water = $\frac{2 \times 60}{360} \times \pi \times 10 \times 12$ = 125.7 2007Q9</p>	A1 M1 M1 A1 4 M
55.	<p>a). I.S.F = $\sqrt{\frac{20}{45}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$ Therefore I.S.F = $\frac{8}{27}$ Capacity of smaller container $\frac{8}{27} \times 0.945$ 0.281 or 280ml (280cm³)</p> <p>b). let depth be h $45(13-h) = 20h$ $585 = 65h$ $H = 9$</p> <p>c). amount in smaller container</p>	M1 M1 A1 A1 A1 A1 M1 A1 M1 A1

	$\frac{1}{5} \times 9 \times 45 + 20 \times 9$ $= 261$ Height in smaller container $\frac{261}{20} = 13.05 \text{ cm}$ Difference $13.05 - \frac{4}{5} \times 9$ $= 13.05 - 7.2$ $= 5.85$	M1 A1 2 M	2007Q22
56.	$23.50 + (7 \text{ h } 15 \text{ minutes} + 45 \text{ minutes} + 5 \text{ h } 40 \text{ minutes})$ $= 1330 \text{ h}$ $= 1.30 \text{ pm on Monday}$	B1 B1 2 M	2008Q4
57.	Volume of liquid = $\frac{384}{0.6}$ Height of liquid = 640×3.22 $= 19.89$	M1 M1 A1 3 M	2008Q7
58.	Volume of sphere = $\frac{4}{3}\pi \times 4.23$ Side of cube = $3 \frac{4}{3}\pi \times 4.23$ $= 6.77$	M1 M1 A1 3 M	2008Q9
59.	Area of rectangular part $= 2 \times 5.2 \times \pi \times 18$ $= 187.2 \pi$ Area of circular parts $= 2 \times 5.22 \times \pi$ $= 54.08 \pi$ $\pi (187.2 + 54.08) = 241.28 \pi$	M1 M1 A1 3 M	2008Q13
60.	a). $\frac{1}{3} \times \frac{22}{7} \times 21 \times 21 \times 30$ $= 13860$ b). i). $r/21 = \frac{36}{30}$ $r = \frac{36 \times 21}{30}$ $= 25.2$ ii). $\frac{1}{3} \times \frac{22}{7} \times 25.2 \times 25.2 \times 36$	M1 A1 M1 A1	

	$= 23950.08$ $= 23950.08 - 13860$ $= 10090.08 \text{ cm}^3$ iii). $\frac{4}{3} \times \frac{22}{7} \times r^3 = 10090.8$ $r^3 = \frac{10090.08 \times 21}{4 \times 22}$ $R = 3\sqrt[3]{2407.86}$ $= 13.40 \text{ cm}$	M1 M1 A1 M1 M1	2008Q22
61.	$AC = \sqrt{85^2 - 75^2} = 1600$ $= 40$ Area of quad ABCD $= \frac{1}{2} \times 40 \times 75 +$ $\sqrt{75(75 - 60)(75 - 50)(75 - 40)}$ $= 1500 + \sqrt{984375}$ $= 1500 + 992$ $= 2492 \text{ m}^2$ $= 0.25 \text{ ha}$	M1 M1 A1 B1 4 M	2009Q6
62.	Time between Monday 0545h and Friday 1945h $= 4 \times 24 + 14$ $= 110 \text{ h}$ Time lost = $0.5 \times 110 = 55$ minutes Time shown in 12 hours system $1945 - 55 = 1850 \text{ h}$ $= 6.50 \text{ p.m}$	M1 M1 A1 3 M	2009Q7
63.	$2\pi r^2 + 2\pi rh = 154$ $r = h$ $2\pi r^3 + 2\pi r^2 = 154$ $4\pi r^2 = 154$ $r = \sqrt{\frac{154}{4 \times 3.142}}$ $= 3.500$ diameter = $2r = 3.500 \times 2$	M1 M1 A1	

	= 7.00 (s dp) 2010Q14	3
64.	Accept $\frac{2}{3} = 0.666$ re-use of decimals Apply Pa- if not 4 sig figs Let OC = r $\therefore CD = \frac{2}{3}r$ and $EF = \frac{2}{3}r + 5$ $\frac{2}{3}r + \frac{2}{3}(r + 5) + 5 + 5 = 24$ $\frac{4}{3}r = 10\frac{2}{3}$ r=8 2010Q15	M1 M1
65	(a) (i) internal volume of box = $150 \times 80 \times 40 \text{cm}^3$ = $480,000 \text{cm}^3$ external volume of box = $152 \times 82 \times 42 \text{cm}^3$ = 523488cm^3 Volume of wood = $(523488 - 480,000) \text{cm}^3$ = 43488cm^3 (ii) mass of box = $\frac{43488 \times 0.6}{1000}$ = 26092 = 26.1kg (b) (i) no of tins = $\frac{150}{10} \times \frac{80}{10} \times \frac{40}{10}$ = 240 (ii) total mass = $26.1 + \left(\frac{240 \times 120}{1000}\right)$ = 54.9kg 2010Q18	
66.	$\sqrt{11.252^2 - 6.75^2} - 9$ Perimeter = $2(9 + 6.75)$ = 31.5 2011Q2	B1 B1 2
67	Internal dimensions:	B1

	40,20 and 15 Volume unoccupied = $40 \times 20 \times 15 - 8000 = 4000$ Height unoccupied $\frac{4000}{40 \times 20}$ = 5cm 2011Q7	M1 M1 A1 4
68.	(a) (i) surface area of the solid = $\pi \times 6 \times 10 + \frac{4}{2} \times \pi \times 6^2$ = 414.69 (ii) height of the cone: = $\sqrt{100 - 36} = 8$ Therefore: volume of the solid = $\frac{1}{3} \times \pi \times 6^2 \times 8 + \frac{1}{2} \times \frac{4}{3} \times \pi \times 6^3$ = 753.98cm^3 (b) mass of the solid in kg = $\frac{1.3 \times 753.98}{100}$ = 0.9802 to 4 significant to s.f. 2011Q17	M1 M1 A1 B1 M1 M1 A1 M1 M1 A1

69.	$\frac{24}{2} = \frac{1}{2} \times 8 \times x \sin 30^\circ$ $x = \frac{12}{4 \sin 30} = 6 \text{ cm}$ <p>Perimeter = $2(6+8) = 28$</p> <p style="text-align: right;">2012 Q4</p>	M1 M1 A1 3
70.	<p>Volume of solid</p> $= \frac{1}{3} \times \frac{22}{7} \times 10.5^2 \times 15 - \frac{22}{7} \times 3.5^2 \times 8$ $= 1732.5 - 308$ $= 1424.5 \text{ cm}^3$ <p style="text-align: right;">2012 Q15</p>	M1 M1 A1 3
71. (a)	$ AB = \sqrt{169 - 25} = 12$	B1
(b)	$2 \times 5 \times 12 + 2 \times 5 \times 15 + 2 \times 12 \times 15$ $= 630 \text{ cm}^2$	M1 M1 A1
(c)	<p>Volume = $5 \times 12 \times 15 \text{ cm}^3$</p> <p>Mass = $7.6 \times 5 \times 12 \times 15$</p> $= 6840 \text{ gm}$ $= \frac{6840}{1000}$ $= 6.84 \text{ kg}$	M1 M1 M1 A1
(d)	$\frac{150 \times 120 \times 100 \text{ cm}^3}{15 \times 12 \times 5 \text{ cm}^3}$ $= 2000$ <p style="text-align: right;">2012Q18</p>	M1 A1 10