01. 0580_m24_ms_22 Q: 4

	$a = 18$ $b = 10$ $c = 4$ $d = 9$	**4**	**B1** for each If 0 scored, **SC1** for b or c = 4, 5 or 10

02. 0580_m24_ms_22 Q: 10

	26.6	**2**	**M1** for $\frac{1}{2}\times(5.3+8.7)\times 3.8$ oe

03. 0580_s24_ms_21 Q: 7

(a)	146 or 146.2 to 146.3	**3**	**M1** for $\frac{1}{2}\times 12.8\times 12.8$ **M1** for $\left[\frac{1}{2}\times\right]\pi\times\left(\frac{12.8}{2}\right)^2$

Question	Answer	Marks	Partial Marks
(b)	51[.0] or 51.00 to 51.01…	**4**	**M1** for $\frac{1}{2}\times\pi\times 12.8$ **M2** for $\sqrt{12.8^2+12.8^2}$ or $\frac{12.8}{\sin 45}$ oe or **M1** for $12.8^2+12.8^2$ oe or $\sin 45 = \frac{12.8}{KL}$ oe

04. 0580_s24_ms_21 Q: 14

Question	Answer	Marks	Partial Marks
	221 or 220.5 to 220.6	**3**	**M2** for $\frac{360-48}{360}\times\pi\times 9^2$ or **M1** for $\frac{k}{360}\times\pi\times 9^2$ where $k < 360$ or **B1** for 312

05. 0580_s24_ms_23 Q: 4

	4	**2**	**M1** for 10 × 7 × [...] = 280 oe or better

06. 0580_m23_ms_22 Q: 18

18	99	**3**	**M2** for $44\times\left(\frac{81}{24}\right)^{\frac{2}{3}}$ oe or **M1** for $\left(\frac{81}{24}\right)^{\frac{1}{3}}$ oe or $\left(\frac{24}{81}\right)^{\frac{1}{3}}$ oe or $\left(\frac{44}{Area}\right)^{3}=\left(\frac{24}{81}\right)^{2}$ oe

07. 0580_s23_ms_21 Q: 6

Question	Answer	Marks	Partial Marks
	57.9 or 57.90 to 57.91...	**2**	**M1** for $\frac{4}{3}\times\pi\times\left(\frac{4.8}{2}\right)^{3}$

08. 0580_s23_ms_22 Q: 11

Question	Answer	Marks	Partial Marks
	9.1	**3**	**M2** for $\frac{140}{360}\times[\pi]\times(3.2+2.6)^2-\frac{140}{360}\times[\pi]\times3.2^2$ oe or **M1** for $\frac{140}{360}\times[\pi]\times3.2^2$ oe or $\frac{140}{360}\times[\pi]\times(3.2+2.6)^2$ oe or $[\pi]\times(3.2+2.6)^2-[\pi]\times3.2^2$

09. 0580_s23_ms_23 Q: 3

Question	Answer	Marks	Partial Marks
	158	**3**	**M2** for $[2](8\times5+8\times3+5\times3)$ or **M1** for 8×5 or 8×3 or 5×3

10. 0580_s23_ms_23 Q: 16

Question	Answer	Marks	Partial Marks
	7.00 or 6.998 to 7.002	**3**	**M2** for $[r^2]=\frac{1970}{12.8\times\pi}$ oe or better or **M1** for $1970=\pi\times r^2\times 12.8$ or better

11. 0580_w23_ms_22 Q: 18

Question	Answer	Marks	Partial Marks
	408 or 408.4 to 408.5	**4**	**M3** for $2\times\pi\times5\times8+2\times\pi\times5^2$ oe OR **M1** for $2\times\pi\times5\times8$ **M1** for $[2]\times\pi\times5^2$

12. 0580_w23_ms_22 Q: 20

Question	Answer	Marks	Partial Marks
	6.5 nfww	**3**	**M2** for $\frac{55.2+0.05}{8\text{ to}9}$ or $\frac{55.2\text{ to }55.3}{9-0.5}$ or **M1** for 9 + 0.5 or 9 – 0.5 or 55.2 + 0.05 or 55.2 – 0.05

13. 0580_w23_ms_23 Q: 11

Question	Answer	Marks	Partial Marks
	1.573 cao	**4**	**B3** for answer figs 157[0] or 1573… OR **M2** for $\frac{4}{3}\times\pi\times3.6^3\times8.05$ oe or better or **M1** for $\frac{4}{3}\times\pi\times3.6^3$ oe **M1** for division by 1000 of *their* mass in g **and** correct rounding to 3 dp

14. 0580_w23_ms_23 Q: 16

Question	Answer	Marks	Partial Marks
	693 or 692.7 to 692.8…	**4**	**M2** for $\frac{105}{2\times12.5}$ oe or **M1** for $2 \times \pi \times r \times 12.5 = 105\pi$ or better **M1** for $\pi \times (\textit{their } r)^2 \times 12.5$

15. 0580_m22_ms_22 Q: 4

Question	Answer	Marks	Partial Marks
	166	**3**	**M2** for [2 ×] (7×4 + 4×5 + 5×7) or **M1** for 7×4 or 4×5 or 5×7

16. 0580_m22_ms_22 Q: 14

Question	Answer	Marks	Partial Marks
	29.5 or 29.53…	**2**	**M1** for $2\times\pi\times4.7$ oe
	$\frac{7}{3}$ oe improper fraction	**M1**	or $\frac{k}{3}\times\frac{11}{14}$ where $k > 3$

17. 0580_m22_ms_22 Q: 17

Question	Answer	Marks	Partial Marks
	77.8 or 77.77 to 77.80	5	**B4** for answer 22.2[%] or 22.20[%] to 22.23[%] OR **M1** for $tan^{-1}\frac{11}{4}$ oe or $tan^{-1}\frac{4}{11}$ oe **M2** for $4\times11-\frac{their\ acute\ angle}{360}\times\pi\times4^2$ oe or **M1** for $\frac{their\ acute\ angle}{360}\pi\times4^2$ oe **M1** for $\frac{their\ shaded\ area}{4\times11}$ [×100] oe or $\frac{their\ sector\ area}{4\times11}$ ×100 oe

18. 0580_s22_ms_21 Q: 17

Question	Answer	Marks	Partial Marks
	3.37 or 3.367 to 3.368	3	**M2** for isolating r^3, e.g. $r^3=\frac{120}{\pi}$ or **M1** for $\frac{1}{2}\times\frac{4}{3}\times\pi r^3=80$ oe If 0 scored **SC1** for answer 2.67 or 2.672 to 2.673...

19. 0580_s22_ms_22 Q: 5

Question	Answer	Marks	Partial Marks
	180	3	**M2** for $[2\times](8\times6+8\times3+3\times6)$ oe or **M1** for 8×6 or 8×3 or 3×6

20. 0580_s22_ms_22 Q: 23

Question	Answer	Marks	Partial Marks
	18.4 or 18.40…	**4**	**M3** for $\dfrac{600-\frac{1}{2}\times 4\times\pi\times 6.2^2}{6.2\times\pi}$ oe or **M2** for $\frac{1}{2}\times 4\times\pi\times 6.2^2+\pi\times 6.2\times l=600$ oe or $\dfrac{600-4\times\pi\times 6.2^2}{6.2\times\pi}$ or better or **M1** for $\left[\frac{1}{2}\right]\times 4\times\pi\times 6.2^2$ or $\pi\times 6.2\times l$

21. 0580_s22_ms_23 Q: 20

Question	Answer	Marks	Partial Marks
	90.2 or 90.18…	**4**	**B3** for 9.82[%] OR **M3** for $[100\times]\left(k^2-\frac{45}{360}\times\pi\times\left(\frac{k}{2}\right)^2\right)\div k^2$ oe or **M2** for $[100\times]\frac{45}{360}\times\pi\times\left(\frac{k}{2}\right)^2\div k^2$ oe or $k^2-\frac{45}{360}\times\pi\times\left(\frac{k}{2}\right)^2$ or $100\times(k^2-m\pi k^2)\div k^2$ or **M1** for $\frac{c}{360}\times\pi\times\left(\frac{k}{2}\right)^2$ oe or for $(k^2-m\pi k^2)\div k^2$ or for $100\times(k^2-mk^2)\div k^2$

22. 0580_w22_ms_21 Q: 15

Question	Answer	Marks	Partial Marks
	71.6 or 71.61 to 71.62	3	**M2** for $\frac{\text{angle}}{360} = \frac{26-8-8}{2\pi\times 8}$ or better or **M1** for $\frac{\text{angle}}{360}\times 2\pi\times 8$ oe

23. 0580_w22_ms_22 Q: 21

Question	Answer	Marks	Partial Marks
	228 or 228.3 to 228.4	4	**M1** for $\frac{1}{3}\times\pi\times\left(\frac{9.2}{2}\right)^2\times 12.5$ oe **M1** for $\frac{9.2}{12.5} = \frac{diameter}{12.5-5.5}$ oe or better **M1** for $\frac{1}{3}\times\pi\times\left(\frac{their 5.152}{2}\right)^2\times(12.5-5.5)$ oe OR **M2** for $\frac{\pi}{3}\times\left(\frac{9.2}{2}\right)^2\times 12.5 - \frac{\pi}{3}\times r^2\times(12.5-5.5)$ oe for any $r < 4.6$ If 0 scored **SC1** for 913 or 913.3 to 913.5

24. 0580_w22_ms_22 Q: 22

Question	Answer	Marks	Partial Marks
	45	3	**M2** for $\sqrt[3]{\frac{875}{56}}\times 18$ oe or **M1** for $\sqrt[3]{\frac{875}{56}}$ or $\sqrt[3]{\frac{56}{875}}$ oe or $\frac{18^3}{h^3} = \frac{56}{875}$ oe

25. 0580_w22_ms_23 Q: 10

Question	Answer	Marks	Partial Marks
(a)	9.8[0] or 9.797 to 9.798	**3**	**M2** for $14^2 - 10^2$ oe or better or **M1** for $10^2 + h^2 = 14^2$ oe or better
(b)	33.8 or 33.79 to 33.80	**1**	**FT** 24 + *their* **(a)**

26. 0580_w22_ms_23 Q: 18

Question	Answer	Marks	Partial Marks
	16	**3**	**M2** for $12 \times \sqrt[3]{\frac{768}{324}}$ oe or **M1** for $\sqrt[3]{\frac{768}{324}}$ or $\sqrt[3]{\frac{324}{768}}$ or $\frac{h^3}{12^3} = \frac{768}{324}$ oe

27. 0580_m21_ms_22 Q: 12

Question	Answer	Marks	Partial Marks
	34.6 or 34.63 to 34.64	**3**	**M2** for $\frac{1}{4} \times \pi \times 5^2 + \frac{1}{2} \times 5 \times 6$ oe or **M1** for $\frac{1}{4} \times \pi \times 5^2$ oe or $\frac{1}{2} \times 5 \times 6$ oe

28. 0580_s21_ms_22 Q: 19

Question	Answer	Marks	Partial Marks
(a)	77.3 or 77.32 to 77.33…	3	**M2** for $\frac{360-60}{360}\times\pi\times12.4\times2$ oe $[\pm n\times12.4]$ or **M1** for angle 60° or 300° soi or for $\frac{k}{360}\times\pi\times12.4\times2$ oe $[\pm n\times12.4]$
(b)	5.17 or 5.172 to 5.173…	3	**M2** for $\frac{74.5}{\pi}\times\frac{360}{360-41}=r^2$ oe or better or **M1** for $74.5=\frac{360-41}{360}\times\pi r^2$ oe or for $\sqrt{\frac{74.5}{\pi}\times\frac{360}{k}}$ oe

29. 0580_m20_ms_22 Q: 7

Question	Answer	Marks	Partial Marks
(a)	45.9	2	**M1** for 0.5 × 8.5 × 10.8 oe
(b)	33[.0] or 33.04…	3	**M2** for $8.5+10.8+\sqrt{8.5^2+10.8^2}$ oe or **M1** for $8.5^2+10.8^2$ oe

30. 0580_P20_ms_20 Q: 4

	Answer	Mark	Partial Marks
	Identifies error correctly (Refers to $100\,mm^2 = 1\,cm^2$ oe)	1	

31. 0580_P20_ms_20 Q: 17

	Answer	Mark	Partial Marks
	69.3 or 69.28...	4	**M2** for height $\sqrt{8^2-4^2}$ oe or **M1** for $4^2+h^2=8^2$ oe **and M1** for $\frac{1}{2}(8+12)\times$ *their* perp height oe

32. 0580_P20_ms_20 Q: 23

	Answer	Mark	Partial Marks
	27	3	**M2** for $\frac{6\pi}{2\times\pi\times9}\times\pi\times9^2$ oe or **M1** for $\frac{6\pi}{2\times\pi\times9}$ oe

33. 0580_s20_ms_21 Q: 1

	Answer	Marks	Partial Marks
	86	**2**	**M1** for correct method to find the perimeter e.g. $(8 + 3) \times 2 \times 5 - 3 \times 8$ If 0 scored, **SC1** for answer 98

34. 0580_s20_ms_21 Q: 22

	Answer	Marks	Partial Marks
	142 or 142.2 to 142.3	**3**	**M2** for $\frac{1}{2}\times7.4\times7.4\times\sin60\times6$ or $\tan60\times\frac{7.4}{2}\times\frac{7.4}{2}\times6$ or **M1** for $\frac{1}{2}\times7.4\times7.4\times\sin60$ or $\tan60\times\frac{7.4}{2}$

35. 0580_s20_ms_22 Q: 6

	Answer	Marks	Partial Marks
	45	**2**	**M1** for $\frac{11+7}{2}\times5$ oe

36. 0580_s20_ms_22 Q: 24

	Answer	Marks	Partial Marks
	25.6 or 25.59 to 25.60…	4	**M3** for $\frac{6.4}{2\times\pi\times8}\times\pi\times8^2$ or **M2** for $\frac{x}{360}=\frac{6.4}{2\times\pi\times8}$ oe or **M1** for $\frac{x}{360}\times2\times\pi\times8=6.4$ oe

37. 0580_s20_ms_23 Q: 2

	Answer	Marks	Partial Marks
	208	1	

38. 0580_s20_ms_23 Q: 9

	Answer	Marks	Partial Marks
	15.5 or 15.48 to 15.49	3	**B2** for 1550 or 1548 to 1549 or **M2** for $\frac{42}{360}\times\pi\times6.5^2$ or **M1** for $\frac{42}{360}\times\pi\times65^2$

39. 0580_s20_ms_23 Q: 10

	Answer	Marks	Partial Marks
	141 or 141.3 to 141.4	4	**M1** for $[2\times]\ \pi\times3^2$ **M2** for $2\times\pi\times3\times4.5$ or **M1** for $2\times\pi\times3$ $[\times4.5]$

40. 0580_s20_ms_23 Q: 12

	Answer	Marks	Partial Marks
	3.7[0] or 3.689 to 3.699…	**3**	**M2** for $\frac{19.02}{2+\pi}$ or **M1** for $2r+\pi r$ [=19.02] oe

41. 0580_w20_ms_21 Q: 18

Question	Answer	Marks	Partial Marks
	990 or 989.58 to 989.73	**4**	**M1** for $4\times\pi\times7^2$ [÷2] **M1** for $\pi\times7^2$ **M1** for $\pi\times7\times2\times12$

42. 0580_w20_ms_22 Q: 7

Question	Answer	Marks	Partial Marks
	9	**2**	**M1** for $\frac{1}{2}\times6\times h=27$ oe

43. 0580_w20_ms_22 Q: 15

Question	Answer	Marks	Partial Marks
	29.5 or 29.45 to 29.46	**2**	**M1** for $\frac{60}{360}\times\pi\times7.5^2$ oe

44. 0580_w20_ms_23 Q: 7

Question	Answer	Marks	Partial Marks
	45.7	**1**	

45. 0580_m19_ms_22 Q: 10

	Answer	Mark	Partial Marks
	375	3	**M2** for $2(12\times5+12\times7.5+5\times7.5)$ oe or **M1** for 12 × 5 or 12 × 7.5 or 5 × 7.5

46. 0580_m19_ms_22 Q: 12

	Answer	Mark	Partial Marks
	4.21 or 4.212....	3	**M2** for $\sqrt{\frac{275\times3}{14.8\times\pi}}$ oe or **M1** for $275=\frac{1}{3}\times\pi\times r^2\times14.8$ oe

47. 0580_m19_ms_22 Q: 18

	Answer	Mark	Partial Marks
	917 or 918 or 917.4 to 917.6	3	**M2** for $\pi\times2.6^2\times12\times60\times60\div1000$ or **M1** for $\pi\times2.6^2$ isw or $12\times60\times60\div1000$ isw If 0 scored **SC1** for figs 917 to 918

48. 0580_s19_ms_21 Q: 4

	Answer	Mark	Partial Marks
	46.5	1	

49. 0580_s19_ms_21 Q: 5

	Answer	Mark	Partial Marks
	5	2	**M1** for $180\div6^2$ oe

50. 0580_s19_ms_21 Q: 19

	Answer	Mark	Partial Marks
	1500	3	**M2** for $12 \div \left(\frac{20}{100}\right)^3$ oe or **M1** for $\left(\frac{20}{100}\right)^3$ or $\left(\frac{100}{20}\right)^3$ oe OR **M1** for $\div 20^3$ oe **M1** for $\times 100^3$ oe

51. 0580_s19_ms_22 Q: 7

	Answer	Mark	Partial Marks
	14.7	2	**M1** for $\frac{1}{2} \times 8.4 \times 3.5$ oe

52. 0580_s19_ms_23 Q: 12

	Answer	Mark	Partial Marks
	72.8 or 72.79 to 72.80…	2	**M1** for $\frac{217}{360} \times \pi \times 6.2^2$

53. 0580_s19_ms_23 Q: 25

	Answer	Mark	Partial Marks
(a)	126	4	**M3** for $\frac{360 - [180 - (360 \div 5)]}{2}$ or $\frac{360 - 180 \times (5-2) \div 5}{2}$ or **M2** for $\frac{180 \times (5-2)}{5}$ or $180 - \frac{360}{5}$ or **M1** for $180 \times (5-2)$ or $\frac{360}{5}$
(b)	7 : 2	2	**M1** for $\sqrt{\frac{73.5}{6}}$ or $\sqrt{\frac{6}{73.5}}$

54. 0580_w19_ms_21 Q: 17

	Answer	Mark	Partial Marks
	6.28 or 6.283 to 6.284	3	**M2** for $\frac{45}{360}\times\pi\times5^2$ oe **and** $\frac{45}{360}\times\pi\times3^2$ oe or **M1** for $\frac{45}{360}\times\pi\times5^2$ oe or $\frac{45}{360}\times\pi\times3^2$ oe or $\pi\times5^2-\pi\times3^2$ oe

55. 0580_w19_ms_21 Q: 22

	Answer	Mark	Partial Marks
	2592	4	**M3** for $1.2\times100\times60\times60\times6\div1000$ oe or **M2** for $1.2\times60\times60\times6$ oe or **M1** for figs $12\times$ figs 6 or 60×60 or correct conversion e.g. their value in $cm^3\div1000$ their value in $m^3\times1000$ 1.2×100 $6\div10\,000$

56. 0580_w19_ms_22 Q: 13

	Answer	Mark	Partial Marks
	352	3	**B2** for figs 352 or **M1** for $\left(\frac{75}{30}\right)^3$ oe or $\left(\frac{30}{75}\right)^3$ oe OR **M2** for $5.5\times\left(\frac{30}{75}\right)^3\times1000$

57. 0580_w19_ms_23 Q: 9

	Answer	Mark	Partial Marks
	298	3	**M2** for [2 ×] (5 × 7 + 5 × 9.5 + 7 × 9.5) oe or **M1** for one correct area, 5 × 7 or 5 × 9.5 or 7 × 9.5

58. 0580_w19_ms_23 Q: 22

	Answer	Mark	Partial Marks
	15.2	5	**M4** for $\left(\pi\times5^2\times12-\frac{1}{3}\times\pi\times5^2\times4.8\right)\div\left(\pi\times5^2\right)$ or **M3** for $\pi\times5^2\times12-\frac{1}{3}\times\pi\times5^2\times4.8$ or **M1** for $\pi\times5^2\times12$ **M1** for $\frac{1}{3}\times\pi\times5^2\times4.8$

59. 0580_s18_ms_21 Q: 6

	Answer	Mark	Partial Marks
	81.7 or 81.71 to 81.72…	2	**M1** for $\pi\times5.1^2$

60. 0580_s18_ms_22 Q: 14

	Answer	Mark	Partial Marks
	62	3	**M1** for [height =] 21 ÷ 7 **M1** for 2(1 × *their*3 + *their*3 × 7 + 1 × 7) oe

61. 0580_s18_ms_22 Q: 15

	Answer	Mark	Partial Marks
	628 or 628.3 to 628.4 cm^3	3	**B2** for 628 or 628.3 to 628.4 or **M1** for $5^2 \times 8 \times \pi$ **B1** for cm^3

62. 0580_w18_ms_21 Q: 10

	Answer	Mark	Partial Marks
	900	3	**M2** for $\frac{150\times100\times60}{1000}$ oe or **M1** for 150 × 100 × 60 or 1.5[× 1] × 0.6 or **B1** for figs 9

63. 0580_w18_ms_22 Q: 11

	Answer	Mark	Partial Marks
	34.5 and 37.5 final answers	2	**B1** for 11.5 or 12.5 seen or **M1** for $(12 - 0.5) \times 3$ or $(12 + 0.5) \times 3$

64. 0580_w18_ms_22 Q: 21

	Answer	Mark	Partial Marks
	30.2 or 30.20 to 30.21…	4	**M3** for $\frac{1}{2}\times10\times10\times\sin60-\frac{60}{360}\times\pi\times\left(\frac{10}{2}\right)^2$ or **M1** for $\frac{k}{360}\times\pi\times\left(\frac{10}{2}\right)^2$ oe and **M1** for $\frac{1}{2}\times10\times10\times\sin c$ oe

65. 0580_w18_ms_23 Q: 19

	Answer	Mark	Partial Marks
	$[p =]$ 12 $[q =] \frac{12}{5}$ oe	3	**B1** for $[p =]$ 12 and **B2** for $[q =] \frac{12}{5}$ or **M1** for $\frac{72}{360}[\times\pi]\times2\times6$ oe

66. 0580_s17_ms_21 Q: 19

	Answer	Mark	Partial Marks
	5.53 or 5.54 or 5.534 to 5.543…	4	**M3** for $2 \times \{(\frac{40}{360} \times \pi \times 10^2) - (\frac{1}{2} \times 10^2 \times \sin 40)\}$ or **M2** for $\left[\frac{1}{2}\times\right] 10^2 \times \sin 40$ and $[2\times]\frac{40}{360} \times \pi \times 10^2$ or **M1** for $\left[\frac{1}{2}\times\right] 10^2 \times \sin 40$ or $[2\times] \frac{40}{360} \times \pi \times 10^2$

67. 0580_s17_ms_22 Q: 3

	Answer	Mark	Partial Marks
	[0].62	1	

68. 0580_s17_ms_23 Q: 5

	Answer	Mark	Partial Marks
	68.6 or 68.62 to 68.64	2	**M1** for $\frac{1}{2}\times\frac{4}{3}\pi\times 3.2^3$ If zero scored, **SC1** for final answer 137 or 137.2 to 137.3

69. 0580_w17_ms_21 Q: 20

	Answer	Mark	Partial Marks
(a)	1480	1	
(b)	30	3	**M2** for $10\times\sqrt{\frac{3960}{440}}$ or $10\div\sqrt{\frac{440}{3960}}$ or **M1** for $\sqrt{\frac{3960}{440}}$ or $\sqrt{\frac{440}{3960}}$ or $\left(\frac{h}{10}\right)^2=\frac{3960}{440}$ oe

70. 0580_w17_ms_22 Q: 7

	Answer	Mark	Partial Marks
	32	2	**M1** for $\frac{1}{2}\times 33\times h=528$ oe

71. 0580_w17_ms_22 Q: 23

	Answer	Mark	Partial Marks
	[k =] 3 [c =] 9	3	**M1** for $\frac{30}{360}\times\pi\times 6^2$ **M1** for $\frac{1}{2}\times 6\times 6\times\sin 30$

72. 0580_w17_ms_23 Q: 20

	Answer	Mark	Partial Marks
	139 or 139.2 to 139.3	4	**M3** for $10^2 + \frac{1}{2} \times \pi \times 5^2$ or **M2** for $\frac{1}{2} \times \pi \times 5^2$ or **M1** for radius = 5 or [area of square]10^2
	cm^2	1	

73. 0580_m16_ms_22 Q: 7

	Answer	Mark	Partial Marks
	130 or 130.0 to 130.1	2	**M1** for ½ × 22.3 × 27.6 × sin25

74. 0580_m16_ms_22 Q: 11

	Answer	Mark	Partial Marks
	16.58 cao	3	**B2** for 16.6 or 16.580 to 16.583 final answer or 16.58 not as final answer or **M1** for $\frac{38}{360} \times 2 \times \pi \times 25$ and **B1** for rounding their more accurate answer correctly to 4sf

75. 0580_s16_ms_21 Q: 20

	Answer	Mark	Partial Marks
	27	3	**M2** for $\frac{6\pi}{\pi \times 2 \times 9} \times \pi \times 9^2$ oe or **M1** for $\frac{6\pi}{\pi \times 2 \times 9}$ oe

76. 0580_s16_ms_21 Q: 23

	Answer	Mark	Partial Marks
	69.3 or 69.28…	4	**M2** for height = $\sqrt{8^2 - 4^2}$ or **M1** for $4^2 + h^2 = 8^2$ oe **and M1** for $\frac{1}{2}(8+12) \times$ *their* perp height oe

77. 0580_s16_ms_23 Q: 3

	Answer	Mark	Partial Marks
	10.3 oe	2	**M1** for $5x = 51.5$ oe

78. 0580_s16_ms_23 Q: 15

	Answer	Mark	Partial Marks
	310 or 310.2 to 310.3	3	**M2** for $7^3 - \frac{1}{2} \times \frac{4}{3} \times \pi \times \left(\frac{5}{2}\right)^3$ or **M1** for $\frac{1}{2} \times \frac{4}{3} \times \pi \times \left(\frac{5}{2}\right)^3$ or **SC1** for $7^3 - \frac{4}{3} \times \pi \times \left(\frac{5}{2}\right)^3$ soi

79. 0580_w16_ms_22 Q: 4

	Answer	Mark	Partial Marks
	58	2	**M1** for $\frac{(13+16) \times 4}{2}$ or $4 \times 13 + \frac{1}{2} \times 4 \times 3$ oe

80. 0580_w16_ms_22 Q: 17

	Answer	Mark	Partial Marks
	1024 cao	5	**B4** for 1023 to 1024.0… or 1020 or **M3** for $\frac{125}{360}\times\pi\times48^2-\frac{125}{360}\times\pi\times40^2+32\times8$ or **M1** for $\frac{125}{360}\times\pi\times48^2$ or $\frac{125}{360}\times\pi\times40^2$ **and M1** for $32\times8+k\pi$ If B0 scored **B1** for *their* more accurate decimal answer rounded correctly to an integer

81. 0580_w16_ms_23 Q: 12

	Answer	Mark	Partial Marks
	32.7 or 32.72 to 32.73	2	**M1** for $\left[\frac{1}{2}\times\right]\frac{4}{3}\times\pi\times\left(\frac{5}{2}\right)^3$

82. 0580_w16_ms_23 Q: 14

	Answer	Mark	Partial Marks
(a)	30	1	
(b)	47.5	2	**M1** for 4.5 × 5 oe

83. 0580_m15_ms_22 Q: 3

	Answer	Mark	Partial Marks
	572.4	2	**M1** for figs (120 × 90 × 53)

84. 0580_P15_ms_20 Q: 5

	Answer	Mark	Partial Marks
	(a) 7853 to 7855 or 7850 or 7860 www	2	**M1** for $\pi \times 50^2$
	(b) 0.7853 to 0.7855 or 0.785 or 0.786	1ft	Their **(a)** ÷ 10 000 evaluated

85. 0580_s15_ms_21 Q: 21

	Answer	Mark	Partial Marks
	285 cao	**4**	**M1** for $\frac{1}{3}\times\pi\times4^2\times9$, 48π **M1** for $\frac{1}{2}\times\frac{4}{3}\times\pi\times4^3$, $\frac{128\pi}{3}$ **A1** for 284.8 to 284.9, $\frac{272\pi}{3}$ If **A0** then **B1** for *their* final answer rounded correctly to nearest whole number from their more accurate answer dependent on at least **M1**

86. 0580_s15_ms_22 Q: 13

	Answer	Mark	Partial Marks
(a)	11	**1**	
(b)	8	**2FT**	**FT** 30 – 2 × *their* **(a)** or **M1** for $4\times7=2(x-1)+FG$ oe or $4(x-4)=2(x-1)+FG$ oe or $2\times7+2(x-4)=2(x-1)+FG$ oe Allow x to be *their* **(a)** in each

87. 0580_s15_ms_22 Q: 18

	Answer	Mark	Partial Marks
(a)	78	**3**	**M2** for $5\times12+\frac{1}{2}\times12\times(8-5)$ **or** $\frac{1}{2}\times6\times(5+8)\times2$ oe or **M1** for 5×12, $\frac{1}{2}\times12\times(8-5)$, $\frac{1}{2}\times6\times(5+8)$ or $12\times8-(\ldots)$
(b)	1170	**1FT**	15 × *their* **(a)**

88. 0580_s15_ms_23 Q: 15

	Answer	Mark	Partial Marks
(a)	4.77 or 4.774 to 4.775	**2**	**M1** for $30 \div [2]\pi$
(b)	35.7 or 35.8 or 35.74 to 35.82	**2**	**M1** for $0.5 \times \pi \times (\textit{their}\ \textbf{(a)})^2$ or $0.5 \times \pi \times (30 \div 2\pi)^2$

89. 0580_s15_ms_23 Q: 18

	Answer	Mark	Partial Marks
	912 or 912.2…	**5**	**M4** for $4 \times 0.5 \times 20 \times \sqrt{8^2 + 10^2} + 20 \times 20$ or better **or** **M3** for $4 \times 0.5 \times 20 \times \sqrt{8^2 + 10^2}$ or better **or** **M1** for $\sqrt{8^2 + 10^2}$ **and** **M1** for $0.5 \times 20 \times \sqrt{8^2 + 10^2}$ **and** **M1** for 20×20

90. 0580_s15_ms_23 Q: 20

	Answer	Mark	Partial Marks
	9.37 or 9.370 to 9.371	6	**M2** for $\sin[P] = \frac{38.5}{0.5\times9\times10}$ or **M1** for $0.5 \times 10 \times 9 \times \sin = 38.5$ **M3** for $\sqrt{(9^2 + 10^2 - 2\times9\times10 \times \cos(\textit{their } P))}$ or **M2** for $9^2 + 10^2 - 2\times9\times10 \times \cos(\textit{their } P)$ or **M1** for a correct implicit expression e.g. $\cos(\textit{their } P) = \frac{9^2 + 10^2 - RQ^2}{2\times9\times10}$ Note: 87.8, 87.81[…] or 87.7[55…] score 4 marks or M is foot of perpendicular from R to PQ **M2** for perp.ht = $38.5 \div \frac{1}{2} \times 10$ or 7.7 or **M1** for $\frac{1}{2} \times 10 \times […] = 38.5$ **M1** for $PM = \sqrt{(9^2 - 7.7^2)}$[= 4.659… or 4.66] **M1** for $QM = 10 - \textit{their}$ 4.659…[= 5.34…] **M1** for $QR = \sqrt{((\textit{their } QM)^2 + 7.7^2)}$

91. 0580_w15_ms_21 Q: 11

	Answer	Mark	Partial Marks
	31.4 or 31.36 to 31.37	3	**M2** for $\left[\frac{2}{2}\times\right] 6.1\times\pi + 2\times6.1$ oe or **B2** for 19.16 to 19.17 or 19.2 or **M1** for $6.1\times\pi$ or for $12.2\times\pi$

92. 0580_w15_ms_21 Q: 19

	Answer	Mark	Partial Marks
	281 or 280.8 to 280.9…	5	**M2** for $\frac{25}{360}\times 2\times\pi\times 15\times 5$ oe or **M1** for $\frac{25}{360}\times 2\times\pi\times 15$ oe and **M1** for $[2]\times\frac{25}{360}\times\pi\times 15^2$ oe and **B1** for $15\times 5[\times 2]$

93. 0580_w15_ms_22 Q: 5

	Answer	Mark	Partial Marks
	262 or 261.7 to 261.83…	2	**M1** for $\frac{1}{2}\times\frac{4}{3}\pi\times 5^3$ If zero scored **SC1** for final answer 524 or 523.5 to 523.7

94. 0580_w15_ms_22 Q: 16

	Answer	Mark	Partial Marks
	36.8 or 36.80 to 36.81	3	**M1** for $\frac{26}{360}\times 2\times\pi\times 15$ **M1** for 2×15 + a term involving π

95. 0580_w15_ms_23 Q: 25

	Answer	Mark	Partial Marks
	2.9[0] or 2.898 to 2.901	5	**M4** for $\frac{30}{360}\times\pi\times 8^2 - 0.5\times 8\cos 30\times 8\sin 30$ or **M1** for $\frac{30}{360}\times\pi\times 8^2$ and **M2** for [area of triangle =] $0.5\times 8\cos 30\times 8\sin 30$ oe or **M1** for $\frac{OC}{8}=\cos 30$ oe or $\frac{BC}{8}=\sin 30$ oe

96. 0580_s14_ms_21 Q: 18

	Answer	Mark	Partial marks
(a)	correct working	**2**	**B2** for $\sqrt[3]{\frac{1}{8}}=\frac{1}{2}$ or $\sqrt[3]{8}=2$ AND $\frac{10}{2}=5$ oe and $\frac{4}{2}=2$ oe or **B1** for $\sqrt[3]{\frac{1}{8}}$ or $\sqrt[3]{8}$ or $8=2^3$ or $\frac{1}{8}=(\frac{1}{2})^3$

	Answer	Mark	Partial marks
(b)	147 or 146.5 to 146.6…	**4**	**M3** for $\frac{7}{8}\times\frac{1}{3}\times\pi\times4^2\times10$ or **M1** for $\frac{1}{3}\times\pi\times4^2\times10$ and **M1** for $\frac{1}{3}\times\pi\times2^2\times5$ and **M1** for subtracting *their* volumes

97. 0580_s14_ms_21 Q: 19

	Answer	Mark	Partial marks
	1.38 or 1.39 or 1.384 to 1.389	**7**	**M3** [Area Δ =] $\frac{1}{2}\times8\cos60\times8\sin60$ or **M1** for [AE =] 8cos 60 and **M1** for [ED] = 8sin 60 and **M1** for Area sector $\frac{30}{360}\times\pi\times8^2$ and **M1** for Area rectangle = 8 × 8cos60 or 8 × 4 **M1** for *their* 32 – (*their* 13.86 + *their* 16.76) or better

98. 0580_s14_ms_23 Q: 21

		Answer	Mark	Partial marks
		62.3 or 62.26 to 62.272	**5**	**M1** for $\frac{2}{3}\times 2\pi\times 6$ and **M2** for $(\frac{2}{3}+\frac{1}{3})\times 2\pi\times 4$ oe or **M1** for $\frac{2}{3}\times 2\pi\times 4$ or $\frac{1}{3}\times 2\pi\times 4$ and **M1** for $2\times(2+4)+k\pi, k\neq 0$

99. 0580_w14_ms_21 Q: 17

	Answer	Mark	Partial marks
	890 or 890.1 to 890.2…	**5**	**M4** for $\frac{1}{2}\times\left(\frac{4}{3}\times\pi\times 5^3\right)+\pi\times 5^2\times 8$ or **M3** for $\frac{1}{2}\times\left(\frac{4}{3}\times\pi\times 5^3\right)$ and $\pi\times 5^2\times 8$ or **M2** for $\frac{1}{2}\times\left(\frac{4}{3}\times\pi\times 5^3\right)$ or $\pi\times 5^2\times 8$ or **M1** for $\frac{4}{3}\times\pi\times 5^3$

100. 0580_w14_ms_22 Q: 14

	Answer	Mark	Partial marks
(a)	2.47 or 2.474 to 2.4744	**2**	**M1** for $\frac{56}{360}\times\pi\times 2.25^2$ oe
(b)	0.742 or 0.7422 to 0.74232	**1FT**	FT *their* **(a)** × 0.3[0] correctly evaluated.

101. 0580_w14_ms_23 Q: 18

	Answer	Mark	Partial marks
(a)	3	4	**B3** for 3.536 to 3.54 as an answer or **M2** for $2000 \div \frac{1}{3}\pi \times 6^2 \times 15$ or **M1** for $\frac{1}{3}\pi \times 6^2 \times 15$ and **SC1** for truncating *their* 3.54 to a whole number
(b)	303 to 304	3	**M2** for 2000 – *their* 3 × *their* volume or **M1** for *their* 3 × *their* volume

102. 0580_s13_ms_21 Q: 15

	Answer	Mark	Partial marks
	2.67 or 2.672 to 2.67301	3	**M2** for $\sqrt[3]{(80 \div \frac{4}{3}\pi)}$ oe or **M1** for $80 \div \left(\frac{4}{3}\pi\right)$ oe

103. 0580_s13_ms_21 Q: 16

	Answer	Mark	Partial marks
	35.4 or 35.36 to 35.37	3	**M2** for $1000 \div (\pi \times 0.75^2 \times 16)$ oe or **M1** for $\pi \times 0.75^2 \times 16$ oe or $1000 \div (\pi \times 0.75^2)$

104. 0580_s13_ms_21 Q: 21

	Answer	Mark	Partial marks
	52.3 or 52.27 to 52.28	3	**SC2** for 28.3 or 28.7 to 28.8 If 0, **M2** for $\frac{135}{360} \times \pi \times 24 + 2 \times 12$ or **M1** for $\frac{135}{360} \times \pi \times 24$

105. 0580_s13_ms_21 Q: 26

	Answer	Mark	Partial marks
	420	5	**M1** for $[CB =]\sqrt{4^2+(9-6)^2}$ **M1** for *their CB* from Pythagoras × 15 **M1** for [2 ×] $\frac{1}{2}(6+9)\times 4$ **M1** for 4 × 15, 9 × 15, 6 × 15 with intention to add

106. 0580_s13_ms_22 Q: 5

	Answer	Mark	Partial marks
	10.5 www	2	**M1** for 42 = ½ × BC × 8 or better

107. 0580_s13_ms_23 Q: 7

	Answer	Mark	Partial marks
	260	3	**M2** for [2 ×](4 × 10 + 18 × 5) oe or **M1** for a correct area statement

108. 0580_w13_ms_21 Q: 18

	Answer	Mark	Partial marks
	486 cao	4	**M1** for $\frac{1}{2}\times 4\pi r^2 + \pi r^2 = 243\pi$ or better **A1** for $[r =]$ 9 **M1** for $\frac{1}{2}\times\frac{4}{3}[\pi](\text{their } r)^3$

109. 0580_w13_ms_21 Q: 19

	Answer	Mark	Partial marks
	(a) 40	2	**M1** for $\frac{144\times 1000}{60\times 60}$ oe
	(b) 3.5	2FT	FT 140 ÷ *their* **(a)** **M1** for dist ÷ *their* **(a)** or dist ÷ 40 or dist × $\frac{60\times 60}{144\times 1000}$ or **B1** for 140 seen

110. 0580_w13_ms_22 Q: 3

	Answer	Mark	Partial marks
	15.7 or 15.70 to 15.71	2	**M1** for $2 \times \pi \times 2.5$

111. 0580_w13_ms_22 Q: 7

	Answer	Mark	Partial marks
	170	2	**M1** for $\frac{1}{2} \times (12 + 22) \times 10$ oe

112. 0580_w13_ms_22 Q: 8

	Answer	Mark	Partial marks
	3619 to 3620	2	**M1** for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 12^3$ or better

113. 0580_w13_ms_23 Q: 5

	Answer	Mark	Partial marks
	(a) 600 000	1	
	(b) 79.2	2	**M1** for $22 \times 60 \times 60 \div 1000$ oe

114. 0580_s12_ms_22 Q: 5

	Answer	Mark	Partial marks
	64000 or 6.4×10^4	2	**SC1** for 63800 or 6.38×10^4 **or** figs 64 or 6.4×10^k in answer space.

115. 0580_s12_ms_22 Q: 7

	Answer	Mark	Partial marks
	4.46 or 4.456 to 4.459 cao	3	**B1** for 28 seen **M1**ft for $\frac{their 28}{2\pi}$ oe or better.

116. 0580_s12_ms_23 Q: 16

	Answer	Mark	Partial marks
	359 www	4	**M1** $\pi \times 4^2$ or $\frac{1}{2}\pi \times 4^2$ **M1** for $0.5 \times \pi \times 8 \times 15$ oe **M1** for 8×15 + their 2 ends + their curved surface area

117. 0580_w12_ms_21 Q: 12

	Answer	Mark	Partial marks
	112 or 112.3 to 112.33	3	**M2** for $\pi \times 6^2 - \pi \times 0.5^2$ or **M1** for $\pi \times 6^2$ or $\pi \times 0.5^2$ seen

118. 0580_w12_ms_21 Q: 14

	Answer	Mark	Partial marks	
	114.6 or 114.57(67027..) to 114.59(1155..)	3	**M2** $2 \times \pi \times 4 \times x/360 = 8$ **or M1** $2 \times \pi \times 4 \times x/360$	**M2** $x/360 = 8/2\pi4$ or **B1** $8/2\pi4$ or $2\pi4/8$ seen

119. 0580_w12_ms_22 Q: 8

	Answer	Mark	Partial marks
	113000 or 112795 to 112840	3	**B1** for 85000 **M1** for $\pi \times 0.65^2 \times$ figs 85

120. 0580_w12_ms_23 Q: 17

	Answer	Mark	Partial marks
	$10r^2$ cao www	3	**B1** for $(\frac{\theta}{360} =) \frac{4r}{2 \times \pi \times 5r}$ **M1** for $\frac{4r}{2 \times \pi \times 5r} \times (5r)^2 \pi$

121. 0580_m24_ms_22 Q: 13

	287	2	**M1** for 360 – (180 – 107) oe or indicates correct angle on a diagram