	Question		Answer	Marks	Guidance	
1	(i)		$h = 3$ soi	B1		allow if used with 6 separate trapezia
			$\frac{3}{2}\left\{9 + 9.1 + 2(10.7 + 11.7 + 11.9 + 11.0)\right\}$	M1	basic shape of formula correct with their 3; omission of brackets may be recovered later; M0 if any x-values used (NB $y0 = 9$ and $x3 = 9$, so check position)	with 3, 4 or 5 y-values in middle bracket, eg $\frac{3}{2}\left\{9 + 2(10.7 + 11.7 + 11.9) + 11.0\right\}$
			all y-values correctly placed in formula	B1	condone omission of outer brackets	
			163.05 or 163.1 or 163 isw	A1	answer only does not score	or **B1** + **B3** if 5 separate trapezia calculated to give correct answer NB 29.55 + 33.6 + 35.4 + 34.35 + 30.15
				[4]		
1	(ii)	(*A*)	$-0.001{\times}12^3 - 0.025{\times}12^2 + 0.6{\times}12 + 9$ soi	M1	may be implied by 10.872, 10.87 or 10.9	NB allow misread if minus sign omitted in first term if consistent in (A) and (B). Lose A1 in this part only
			±0.128[m] or ±12.8cm or ±128mm isw	A1	B2 if unsupported	appropriate units must be stated if answer not given in metres
				[2]		

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	Question		Answer	Marks	Guidance	
1	(ii)	(B)	$F[x] = \dfrac{-0.001x^4}{4} - \dfrac{0.025x^3}{3} + \dfrac{0.6x^2}{2} + 9x$	M2	M1 if three terms correct ; ignore $+ c$	
			$F(15)$ $[- F(0)]$ soi	M1	dependent on at least two terms correct in $F[x]$	condone $F(15) + 0$
			161.7 to 162	A1	A0 if a numerical value is assigned to c	answer only does not score
						NB allow misread if minus sign omitted in first term if consistent in (A) and (B). 187.03…
				[4]		

2			$h = 1.5$	**B1**	$h = 1.5$	allow if used with 6 separate trapezia
			$\dfrac{1.5}{2} \times (2.3 + 2(2.9 + 4 + 4.6 + 4.2 + 3) + 0)$	**M1**	basic shape of formula correct, omission of brackets may be recovered later	at least 4 y-values in middle bracket, eg $\dfrac{1.5}{2} \times (2.3 + 2(2.9 + 4 + 4.6 + 4.2) + 3)$ **M0** if any x values used
			all y-values correct and correctly placed in formula	**B1**	condone omission of outer brackets and/or omission of 0	
			29.775 to 3 sf or better; isw	**A1**	answer only does not score	or **B1** + **B3** if 6 separate trapezia calculated to give correct answer
				[4]		

Question			Answer	Marks	Guidance	
3	**(i)**		½ × 0.2 (0 + 0 + 2(0.5 + 0.7 + 0.75 + 0.7 + 0.5)) [=0.63]	M3	M2 if one error, M1 if two errors condone omission of zeros or M3 for 0.05 + 0.12 + 0.145 + 0.145 + 0.12 + 0.05 may be unsimplified, must be summed	basic shape of formula must be correct must be 6 strips M0 if brackets omitted, but allow recovery M0 if $h = 1$ or 1.2 Area = 6.3 and 0.53 imply M0
			(their 0.63) × 50 31.5	M1 A1 **[5]**		
3	**(ii)**	(*A*)	$3.8 \times 0.2^4 - 6.8 \times 0.2^3 + 7.7 \times 0.2^2 - 4.2 \times 0.2$ 0.01968 cao isw	M1 A1 **[2]**	±0.58032 implies M1 or B2 if unsupported	condone one sign error allow – 0.01968
3	**(ii)**	(*B*)	$\dfrac{3.8x^5}{5} - \dfrac{6.8x^4}{4} + \dfrac{7.7x^3}{3} - \dfrac{4.2x^2}{2} + c$ F(0.9) [– F(0)] 50 × their ±F(0.9) 24.8 to 24.9 cao	M2 M1* M1dep* A1 **[5]**	M1 for two terms correct excluding *c* condone omission of *c* as long as at least M1 awarded	accept 2.56 to 2.57 for coefficient of x^3 allow M1 if all signs reversed NB F(0.9) = – 0.496...

4	(a)	$10.6^2 + 9.2^2 - 2 \times 10.6 \times 9.2 \times \cos 68°$ o.e.	M1	
		$QR = 11.1(3\dots)$	A1	
		$\frac{\sin 68}{\text{their QR}} = \frac{\sin Q}{9.2}$ or $\frac{\sin R}{10.6}$ o.e.	M1	Or correct use of Cosine Rule
		$Q = 50.01..°$ or $R = 61.98..°$	A1	2 s.f. or better
		bearing = 174.9 to 175°	B1	
4	(b) (i)	(A) ½ $\times 80^2 \times \dfrac{2\pi}{3}$	M1	
		$= \frac{6400\pi}{3}$	A1	6702.(…) to 2 s.f. or more
4	(b) (ii)	$DC = 80 \sin(\frac{\pi}{3}) = 80\frac{\sqrt{3}}{2}$	B1	both steps required
		Area = ½×their DA×40√3 or ½×40√3×80×sin(their DCA) o.e.	M1	s.o.i.
		area of triangle = 800√3 or 1385.64… to 3s.f. or more	A1	
4	(b) (iii)	area of ¼ circle = ½ $\times \frac{\pi}{2} \times (40\sqrt{3})^2$ o.e.	M1	[=3769.9…]
			M1	i.e. their(b) (i) + their (b) (ii) – their ¼ circle o.e.
		"6702" + "1385.6" – "3769.9"	A1	933⅓π + 800√3
		= 4300 to 4320		

5	i	Area = (-)0.136 seen [m^2] www	4	M3 for 0.1/2 × (0.14 + 0.16 + 2[0.22 + 0.31 + 0.36 + 0.32]) M2 for one slip; M1 for two slips must be positive	
		Volume = 0.34 [m^3] or ft from their area × 2.5	1		5
	ii	2x^4 – x^3 – 0.25 x^2 – 0.15x o.e.	M2	M1 for 2 terms correct	
		value at 0.5 [– value at 0]	M1	dep on integral attempted	
		= –0.1375	A1	must have neg sign	
		area of cross section (of trough) or area between curve and x-axis	E1		
		0.34375 r.o.t. to 3 or more sf [m^3]	B1		
		m^3 seen in (i) or (ii)	U1		7