

Q	Marking instructions	AO	Marks	Typical solution												
14(a)	<p>Finds positive or negative y-values for 5 x-values with $h = 0.75$ PI by AWRT 5.28 or AWRT -5.28 or Uses 6 x-values and obtains AWRT 5.42 or AWRT -5.42 In this case maximum mark is M1A0 A0</p>	1.1a	M1	<table border="1"> <thead> <tr> <th>x_n</th> <th>y_n</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> </tr> <tr> <td>1.75</td> <td>-2.51827</td> </tr> <tr> <td>2.5</td> <td>-2.74887</td> </tr> <tr> <td>3.25</td> <td>-1.76798</td> </tr> <tr> <td>4</td> <td>0</td> </tr> </tbody> </table> <p>$\frac{0.75}{2}(0+0+2(-2.51827-2.74887-1.76798))$ Area ≈ 5.28</p>	x_n	y_n	1	0	1.75	-2.51827	2.5	-2.74887	3.25	-1.76798	4	0
	x_n	y_n														
	1	0														
1.75	-2.51827															
2.5	-2.74887															
3.25	-1.76798															
4	0															
<p>Uses the trapezium rule correctly with $h = 0.75$ and correct y-values Accept rounded or truncated values to 3 significant figures.</p>	1.1b	A1														
<p>Obtains AWRT 5.28 Condone AWRT -5.28</p>	3.2a	A1														
	Subtotal		3													

Q	Marking instructions	AO	Marks	Typical solution
14(b)	Sets up integration by parts Condone u and v' in wrong order Must have expressions for u , u' , v and v' with evidence of some integration	3.1a	M1	
	Applies integration by parts correctly to $(2x - 8)\ln x$ to obtain either $(x^2 - 8x)\ln x - \int x - 8 \, dx$ OE or $\frac{1}{4}(2x - 8)^2 \ln x - \int x - 8 + \frac{16}{x} \, dx$ Condone missing brackets or omission of dx	1.1a	M1	$\int_1^4 (2x - 8)\ln x \, dx$ $u = \ln x \quad u' = \frac{1}{x}$ $v' = 2x - 8 \quad v = x^2 - 8x$
	Completes integration fully to obtain either $(x^2 - 8x)\ln x - \frac{x^2}{2} + 8x$ OE or $\frac{1}{4}(2x - 8)^2 \ln x - \frac{x^2}{2} + 8x - 16\ln x$ OE	1.1b	A1	$(x^2 - 8x)\ln x - \int x - 8 \, dx$ $= \left[(x^2 - 8x)\ln x - \frac{x^2}{2} + 8x \right]_1^4$ $= \left((16 - 32)\ln 4 - \frac{4^2}{2} + 32 \right) - \left((1 - 8)\ln 1 - \frac{1^2}{2} + 8 \right)$ $= -16\ln 2^2 + 24 - \frac{15}{2}$ $= \frac{33}{2} - 32\ln 2$
	Substitutes limits 1 and 4 into their integrated function and subtracts either way round	1.1a	M1	Shaded region is below x -axis
	Completes reasoned argument to correctly obtain $\frac{33}{2} - 32\ln 2$ or $32\ln 2 - \frac{33}{2}$ AG Brackets must be correct throughout	2.1	R1	area = $32\ln 2 - \frac{33}{2}$
	Explains change of sign due to shaded region being below x-axis This could be at an earlier stage eg swap limits explained but must still refer to the shaded region being below x-axis	2.4	E1	
	Subtotal		6	
	Question 14 Total		9	