

Q	Marking Instructions	AO	Marks	Typical Solution														
11(a)	Evaluates $f(1)$ and $f(6)$ using exact logs or decimals Award if seen embedded in calculations using more than one trapezium	1.1a	M1	$f(1) = 1.945910149..$ $f(6) = 0.69314718..$ $A = \frac{5}{2} (1.9459 + 0.6931)$ $= 6.5976...$ $= 6.60 \text{ cm}^2$														
	Evaluates an approximate value of the area of R AWRT 6.60 Condone omission of units	1.1b	A1															
Subtotal			2															
11(b)	Writes or uses the six ordinates as $\ln 7, \ln 6, \ln 5, \ln 4, \ln 3, \ln 2$ or Obtains the values of the correct six ordinates in decimal form	1.1b	B1	<table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th>x</th> <th>f(x)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.9459</td> </tr> <tr> <td>2</td> <td>1.7918</td> </tr> <tr> <td>3</td> <td>1.6094</td> </tr> <tr> <td>4</td> <td>1.3863</td> </tr> <tr> <td>5</td> <td>1.0986</td> </tr> <tr> <td>6</td> <td>0.6931</td> </tr> </tbody> </table> $\text{Area} = \frac{1}{2} \times 1 \times (1.9459 + 0.6931 + 2(1.7918 + 1.6094 + 1.3863 + 1.0986))$ $\text{Area} = 7.205633 \text{ cm}^2$ $\text{Volume of Shape B} = 4 \times 7.205633 \times 0.2 = 5.7645... \text{ cm}^3$ $\text{Mass of Shape B} = 5.7645 \text{ cm}^3 \times 10.5 \text{ g/cm}^3 = 60.52731 \text{ g} = 61 \text{ g}$	x	f(x)	1	1.9459	2	1.7918	3	1.6094	4	1.3863	5	1.0986	6	0.6931
	x	f(x)																
	1	1.9459																
	2	1.7918																
	3	1.6094																
4	1.3863																	
5	1.0986																	
6	0.6931																	
Uses the correct formula for the trapezium rule with their six ordinates and $h = 1$ Award this mark if seven ordinates used with $h = \frac{5}{6}$ Answer for seven = 7.2145648..	1.1a	M1																
Evaluates an approximate value for the area of R. Must have used six ordinates AWRT 7.2 PI by correct final answer	1.1b	A1																
Forms an expression for the mass of either one section or all four sections using 'their' area and consistent units PI by correct final answer	3.1b	M1																
Obtains an approximate value for the correct mass of Shape B Must state units If seven ordinates used this mark can be awarded as answer would be 61g CAO	3.2a	A1																
Subtotal			5															
11(c)(i)	Explains that the trapezia are all below the curve or Explains that the curve is concave or Draws a diagram and indicates the gaps	3.5a	E1	The trapezia are all below the curve														
Subtotal			1															
11(c)(ii)	Explains that numbers have been rounded	3.5a	E1	Numbers in the calculation have been rounded														
Subtotal			1															
Question Total			9															