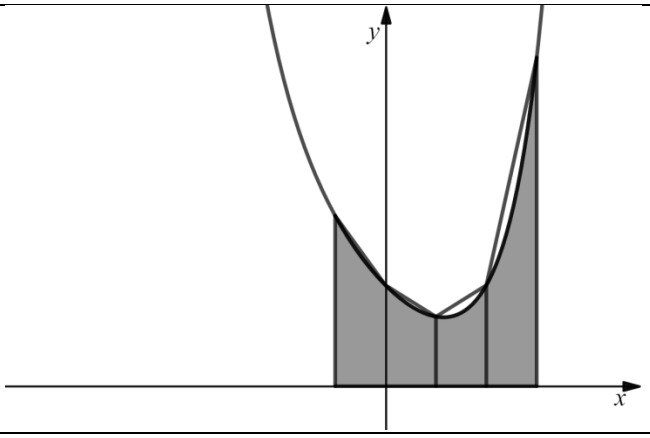
Question	Scheme	Marks	AOs
9(a)	Calculates any 2 of the necessary 5 y values $1.689, 1, 0.689, 1, 3.257$ Allow accuracy to 2 dp rounded or truncated	B1	1.1b
	Correct strip width $h = 0.5$	B1	1.1b
	Correct application of the trapezium rule with their values given to at least 2dp rounded or truncated $\frac{0.5}{2}\{1.689 + 3.257 + 2\times(1 + 0.689 + 1)\}$	M1	2.1
	= 2.58	A1	1.1b
		(4)	
(b)		B1	2.4
	Draws trapezia on Diagram 1 and states that it is an overestimate as the area of the trapezia are greater than the area of R.		
		(1)	
(c)	$\int_{-0.5}^{1.5}\left(2^{x^2+1} + 2x\right)\mathrm{d}x = \int_{-0.5}^{1.5}\left(2\times 2^{x^2} + 2x\right)\mathrm{d}x$ $= 2\int_{-0.5}^{1.5}\left(2^{x^2} - x\right)\mathrm{d}x + \int_{-0.5}^{1.5} 4x\,\mathrm{d}x$	M1	3.1a
	$= 2\times 2.58 + \left[2x^2\right]_{-0.5}^{1.5}$	A1ft	1.1b
	= 5.16+ 4 = 9.16 **or** 2 × "(a)" + 4	A1ft	2.1
		(3)	
			(8 marks)

Notes:

(a)

B1: For finding at least two of the five y values that are required to apply the trapezium rule with four strips.

B1: For a strip width of 0.5. This may be implied by sight of $\frac{0.5}{2}\{.....\}$ or $0.25\{.....\}$

M1: For a full and correct application of the trapezium rule with correct strip width and correct attempt at the y values with an accuracy of at least 2 dp rounded or truncated.

A1: awrt 2.58

(**b)**

B1: Appropriate diagram and explains that the area of each trapezium is greater than the area of the corresponding strip and so concludes that the answer to (a) is an overestimate.

(c)

M1: For the strategy of using the answer to part (a) in an attempt to find (c). Expect to see $2^{x^2+1} = 2\times 2^{x^2}$

followed by, for example, $\int_{-0.5}^{1.5}\left(2^{x^2+1}+2x\right)\mathrm{d}x=\int_{-0.5}^{1.5}\left(2\times 2^{x^2}+2x\right)\mathrm{d}x=2\times\int_{-0.5}^{1.5}\left(2^{x^2}-x\right)\mathrm{d}x\pm\int_{-0.5}^{1.5}kx\,\mathrm{d}x$

A1ft: $2\times(a)+\left[2x^2\right]_{-0.5}^{1.5}$ following through on their answer to part (a)

A1ft: For careful and accurate work leading to an answer of 9.16 units **or** 2 × their (a) + 4