Question Number	Scheme	Marks
5(a)	Identifies $h = 1.5$	B1
	Area = $\frac{1.5}{2}\{12 + 0.023 + 2(4.243 + 1.5 + 0.530 + 0.188 + 0.066)\}$	M1
	$= 18.8$	A1
		(3)
(b) (i)	$\int_{-2}^{7} 3\left(\frac{1}{2}\right)^{x+2} \mathrm{d}x = \frac{1}{4}\int_{-2}^{7} 3\left(\frac{1}{2}\right)^{x} \mathrm{d}x = \frac{1}{4} \times "18.8" = 4.7$	B1ft
(ii)	$\int_{-2}^{7} \left(2^{-x} + 2x\right) \mathrm{d}x = \frac{1}{3} \times "18.8" + \left[x^2\right]_{-2}^{7} = 51.3$	M1, A1ft
		(3)
		(6 marks)

(a) Note that awrt 18.8 with no working is 0 marks

B1: Identifies $h = 1.5$ or may be implied by e.g. 0.75 oe outside of the bracket in the expression for the area

M1: Correct method of finding the area. Requires $\frac{1}{2} \times$ *their* $h \times$ correct bracket structure but condone the omission of a trailing bracket. Allow $h = 1$ if stated but if only an expression is seen then it must be correct. Allow equivalent expressions e.g. they may add together individual trapezia.
Condone invisible brackets to be implied by further work or awrt 18.8 but do not allow just awrt 18.8 with no working seen to score this mark. Condone slips on the digits of the heights, e.g 4.234 for 4.243

A1: 18.8 or better (18.80775) following M1. i.e. if they have carried out the calculation and their 18.8 does not come from 18.0775 (allow truncating or rounding) then A0. Isw
Note that the calculator answer is 17.2785...

(b) Note in part (b) they may have rounded their value in part (a) as their final answer (e.g. 18.8) but then used an earlier unrounded value in part (b). They must give an answer in part (b) that is at least 1dp for the B1ft in (i) and/or A1ft (ii) to be awarded. You will need to check their follow through answers if (a) is incorrect.

Do not accept solutions in (b) which involve re-doing the table of values and attempting the trapezium rule again.

(b)(i) Note if they have awrt 17.3 in (a) then this mark cannot be scored unless we see $\frac{1}{4} \times$ awrt 17.3

B1ft: Calculates $\frac{1}{4} \times "18.8" = "4.7"$

Note that the calculator answer is 4.3196...

(b)(ii) Note if they have awrt 17.3 in (a) then A1ft can be scored following M1.

M1: Recognises that $\int_{-2}^{7} \left(2^{-x}\right) \mathrm{d}x = \frac{1}{3} \times \int_{-2}^{7} 3\left(\frac{1}{2}\right)^{x} \mathrm{d}x$ AND integrates $2x$ to x^2. We must see the x^2 or allow to be implied by limits substituted in and subtracting e.g. $7^2 - (-2)^2$ (or $7^2 - 2^2$ or $49 - 4$) but not just 45

A1ft: 51.3 or ft on their answer to part (a) by adding 45 to $\frac{1}{3} \times "18.8"$. Allow fractions e.g. $\frac{769}{15}$

Note that the calculator answer is 50.7595...

Question Number	Scheme	Marks
6. (i)	$2\log_2(4-x) = 3+\log_2\left(\dfrac{x+11}{2}\right)$	
	One correct law applied – examples (not exhaustive):	
	$2\log_2(4-x) = \log_2(4-x)^2$, $\log_2\left(\dfrac{x+11}{2}\right) = \log_2(x+11) - \log_2 2$	B1
	$3 = \log_2 8$	
	Correctly combines two original terms e.g. $2\log_2(4-x) = \log_2(4x+44)$	M1
	Correct equation not involving logs $(4-x)^2 = 4x+44$	A1
	$x^2 - 12x - 28 = 0 \Rightarrow (x-14)(x+2) = 0 \Rightarrow x = ...$	dM1
	$\Rightarrow x = -2$ only	A1
		(5)
(ii)	Combines $y = 6\times 3^x$ and $y = 3^{2x+1} \Rightarrow 3^{2x+1} = 6\times 3^x$	M1
	$\Rightarrow 3^x \times 3 = 6$	
	$\Rightarrow 3^x = 2 \Rightarrow x = \log_3 2$	dM1, A1
	$y = 6\times 3^{\log_3 "2"} = 6\times "2"$	ddM1
	coordinates of P are: $\left(\log_3 2,\ 12\right)$	A1
		(5)
		(10 marks)

(i)

B1: Sight of one correct log law applied. See scheme. There will be other equivalent examples e.g. $\log_2\left(\dfrac{x+11}{2}\right) = \log_2(x+11) - 1$. This mark can still be awarded if they have made errors before applying the law and do not withhold this mark for any subsequent errors.

M1: Correctly combines two of the three original terms of the equation. e.g. $\log_2\left(\dfrac{2(4-x)^2}{x+11}\right) = 3$

May be implied by a correct equation in any form not involving logs provided it has not come from incorrect log work. e.g. $\dfrac{\log_2(4-x)^2}{\log_2\left(\dfrac{x+11}{2}\right)} = 3 \Rightarrow \dfrac{(4-x)^2}{\dfrac{x+11}{2}} = 8$ is M0

A1: Correct equation in any form not involving logs which has not come from incorrect log work.

dM1: Solves a quadratic equation via factorisation, the formula or completing the square (usual rules apply). They are not allowed to just state the roots. Dependent on the previous method mark.

A1: $x = -2$ only (the 14 if found must be rejected or not included in their final answer)