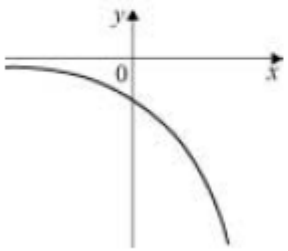
Core 2 integration Answers

2(a)	$h = 1$	B1		PI
	Integral $= \frac{h}{2}\{\ldots\}$ $\{\ldots\} = f(0) + f(4) + 2[f(1) + f(2) + f(3)]$	M1		OE summing of areas of the four trapezia. [0.75+0.35+0.15+0.079…]
	$= \left[1 + \frac{1}{17} + 2\left(\frac{1}{2} + \frac{1}{5} + \frac{1}{10}\right)\right]$	A1		Exact or to 3dp values Condone one numerical slip
	Integral = 1.329	A1	4	**CSO**. Must be 1.329
(b)	Increase the number of ordinates	E1	1	OE
	Total		**5**	

6(a)(i)	y-coordinate of A is $27-3^0;=26$	M1A1	2	
(ii)	When $x=3,\ y=27-3^3=0 \Rightarrow B(3,0)$	B1	1	AG; be convinced
(b)	$h=1$	B1		PI
	Area $\approx h/2\{\ldots\}$ $\{\ldots\}=$ f(0)+f(3)+2[f(1)+f(2)]	M1		OE summing of areas of the 'trapezia'..
	$\{\ldots\}=$ "26" + 0 + 2(24 + 18)	A1√		on (a)(i) (Σtrap= "25"+21+9)
	(Area $\approx$) 55	A1√	4	on [42 + 0.5× "(a)(i)"]
(c)(i)	$\log_{10} 3^x = \log_{10} 13$	M1		Takes ln or $\log_{10}$ on both or $x = \log_3 13$
	$x\log_{10} 3 = \log_{10} 13$	m1		Use of $\log 3^x = x\log 3$ or $\log_3 13 = \frac{\lg 13}{\lg 3}$ OE (PI by $\log_3 13 = 2.335$ or better)
	$x = \frac{\lg 13}{\lg 3} = 2.334717\ldots.$ = 2.3347 to 4dp	A1	3	Must show that logarithms have been used
(ii)	$\{k=\}$ 14	B1	1	Condone $y = 14$; Accept final answer 14 with only zeros after decimal point eg 14.000
(d)(i)	Translation;	B1;		'Translation'/'translate(d)' B0 if more than one transformation
	$\begin{bmatrix} 0 \\ -27 \end{bmatrix}$	B1	2	Accept full equivalent in words provided linked to 'translation/move/shift' and negative y-direction (Note: B0 B1 is possible)
(ii)		B1		Correct shape (translation of given curve vertically downwards)
		B1		Only point of intersection with coord axes is on negative y-axis and curve is asymptotic to the negative x-axis
			2	
	Total		**15**	

2	$h=1$	B1		PI
	$f(x) = \sqrt{2^x}$			
	Area $\approx h/2\{\ldots\}$ $\{\ldots\}=$ f(0)+f(3)+2[f(1)+f(2)]	M1		OE summing of areas of the 'trapezia'..
	$\{\ldots\}= 1 + \sqrt{8} + 2(\sqrt{2} + 2)$	A1		OE
	(Area $\approx$) 5.3284… = 5.328 (to 3dp)	A1	4	CAO Must be 5.328
	Total		**4**	

6(a)	$y_A = 3\left(2^0+1\right)$ $= 6$	M1 A1	 2	Substituting $x = 0$ PI
(b)	$h = 2$ Integral = $h/2$ {……} {….} = $f(0)+2[f(2)+f(4)]+f(6)$ {} = $6+2[3\times5+3\times17]+3\times65$ $= 6+2[15+51]+195$ Integral = 333	B1 M1 A1 A1	 4	PI OE summing of areas of the three traps. Condone 1 numerical slip {ft on (a) for f(0) if not recovered} [Sum of 3 traps. = 21 + 66 + 246] CAO
(c)(i)	$21 = 3\left(2^x+1\right) \Rightarrow 2^x = 6$	B1	1	AG (be convinced)
(ii)	$\log_{10} 2^x = \log_{10} 6$ $x\log_{10} 2 = \log_{10} 6$ $x = \dfrac{\lg 6}{\lg 2} = 2.5849\ldots = 2.58$ to 3sf	M1 m1 A1	 3	Take ln or $\log_{10}$ of both sides of $a^x = b$ or other relevant base if clear. The equation $a^x = b$ used must be correct. Use of $\log 2^x = x\log 2$ OE Both method marks must have been awarded.
	Total		**10**	