1 0	(a)		$0.25\{\sin 0 + \sin\left(\frac{1}{2}\sqrt{0.25}\right) + \sin\left(\frac{1}{2}\sqrt{0.5}\right)$ $+ \sin\left(\frac{1}{2}\sqrt{0.75}\right)\}$	M1	1.2	Attempt four rectangles of width 0.25, with height on left-hand side	No need to see sin0 Allow M1 if evaluated in degrees (0.00452)
			Lower bound = 0.253	A1	1.1	Obtain 0.253, or better	soi as lower bound

Question			Answer	Marks	AO	Guidance	
			$0.25\{\sin\left(\frac{1}{2}\sqrt{0.25}\right)+\sin\left(\frac{1}{2}\sqrt{0.5}\right)+\sin\left(\frac{1}{2}\sqrt{0.75}\right)$ $+\sin\frac{1}{2}\}$	**M1**	**1.1a**	Attempt rectangles of width 0.25, with height on right-hand side	Or subtract sin0 from part (ii) and add sin0.5 Allow M1 if evaluated in degrees (0.00670) M0 if sin0 explicitly included
			Upper bound= 0.373 or 0.374	**A1**	**1.1**	Obtain 0.373 or 0.374 (from rounding upper bound up), or better	soi as upper bound
				[4]			
	(b)	**(i)**	$t^2 = x-1$	**M1**	**2.1**	Attempt to link dt and dx	
			$2t\mathrm{d}t = \mathrm{d}x$	**A1**	**2.1**	Obtain correct equation linking dt and dx	Allow for $\mathrm{d}t = \frac{1}{2}(x-1)^{-\frac{1}{2}}\mathrm{d}x$ oe
			$\int\sin\left(\frac{1}{2}\sqrt{x-1}\right)\mathrm{d}x = \int\sin\left(\frac{1}{2}t\right)2t\mathrm{d}t$ $= \int 2t\sin(\frac{1}{2}t)\mathrm{d}t$ **A.G.**	**A1**	**2.5**	Attempt integrand in terms of t to obtain given answer	Award A1 once all elements are correct, even if not in same order as given answer BOD if no brackets
				[3]			
	(b)	**(ii)**	$-4t\cos\left(\frac{1}{2}t\right)+\int 4\cos\left(\frac{1}{2}t\right)\mathrm{d}t$	**M1***	**3.1a**	Attempt integration by parts	Correct parts As far as first stage
			$-4t\cos\left(\frac{1}{2}t\right)+8\sin\left(\frac{1}{2}t\right)$	**A1**	**2.1**	Correct integral	
			$(-4\cos\frac{1}{2}+8\sin\frac{1}{2})-(-0+0)$	**M1d***	**2.1**	Attempt use of limits	Using either t or x, but must be consistent Condone no clear use of the lower limit for M1
			$8\sin\frac{1}{2}-4\cos\frac{1}{2}$ **AG**	**A1**	**2.4**	Obtain given answer	Must see some indication that lower limit considered
				[4]			