Question	Scheme	Marks	AOs
8(a)	(i) $\int_1^a \sqrt{8x}\,dx = \sqrt{8}\times\int_1^a \sqrt{x}\,dx = 10\sqrt{8} = 20\sqrt{2}$	M1 A1	2.2a 1.1b
	(ii) $\int_0^a \sqrt{x}\,dx = \int_0^1 \sqrt{x}\,dx + \int_1^a \sqrt{x}\,dx = \left[\frac{2}{3}x^{\frac{3}{2}}\right]_0^1 + 10 = \frac{32}{3}$	M1 A1	2.1 1.1b
		(4)	
(b)	$R = \int_1^a \sqrt{x}\,dx = \left[\frac{2}{3}x^{\frac{3}{2}}\right]_1^a$	M1 A1	1.1b 1.1b
	$\frac{2}{3}a^{\frac{3}{2}} - \frac{2}{3} = 10 \Rightarrow a^{\frac{3}{2}} = 16 \Rightarrow a = 16^{\frac{2}{3}}$	dM1	3.1a
	$\Rightarrow a = 2^{4\times\frac{2}{3}} = 2^{\frac{8}{3}}$	A1	2.1
		(4)	
		(8 marks)	

Notes:

(a)(i)

M1: For deducing that $\int_1^a \sqrt{8x}\,dx = \sqrt{8}\times\int_1^a \sqrt{x}\,dx$ attempting to multiply $\int_1^a \sqrt{x}\,dx$ by $\sqrt{8}$

A1: $20\sqrt{2}$ or exact equivalent

(a)(ii)

M1: For identifying and attempting to use $\int_0^a \sqrt{x}\,dx = \int_0^1 \sqrt{x}\,dx + \int_1^a \sqrt{x}\,dx$

A1: For $\frac{32}{3}$ or exact equivalent

(b)

M1: Attempts to integrate, $x^{\frac{1}{2}} \to x^{\frac{3}{2}}$

A1: $\int_1^a \sqrt{x}\,dx = \left[\frac{2}{3}x^{\frac{3}{2}}\right]_1^a$

dM1: For a whole strategy to find a. In the scheme it is awarded for setting $\left[...x^{\frac{3}{2}}\right]_1^a$ =10, using both limits and proceeding using correct index work to find a. Alternatively a candidate could assume $a = 2^k$. In such a case it is awarded for setting $\left[...x^{\frac{3}{2}}\right]_1^{2^k} = 10$, using both limits and proceeding using correct index work to k=..

A1: $a = 2^{4\times\frac{2}{3}} = 2^{\frac{8}{3}}$

In the alternative case, a further statement must be seen following $k = \frac{8}{3}$ Hence True