Question	Scheme	Marks
7	$x=0,\ y=0^2+2=2$	B1
	$\left[y=x^2+2\Rightarrow x^2=y-2\right]$	
	$V=\pi\int_2^a x^2\ \mathrm{d}y\Rightarrow 18\pi=\pi\int_2^a (y-2)\ \mathrm{d}y,=\pi\left[\frac{y^2}{2}-2y\right]_2^a$	M1,M1
	$18\pi=\pi\left[\left(\frac{a^2}{2}-2a\right)-\left(\frac{2^2}{2}-2\times 2\right)\right]$	M1
	$0=a^2-4a-32$	M1A1
	$a^2-4a-32=(a+4)(a-8)=0\Rightarrow a=8$	M1A1 [8]
	ALT	
	$x=0,\ y=0^2+2=2$	[B1
	$\left[y=x^2+2\Rightarrow x^2=y-2\right]$	
	$18\pi=\pi\int_2^a (y-2)\ \mathrm{d}y,\ \ 18\pi=\pi\left[\frac{(y-2)^2}{2}\right]_2^a$	M1,M1
	$18\pi=\pi\left[\left(\frac{a-2}{2}\right)^2-\left(\frac{2-2}{2}\right)^2\right]$	M1
	$18=\left(\frac{a-2}{2}\right)^2\Rightarrow 36=(a-2)^2$	M1A1
	$a=2\pm\sqrt{36}\Rightarrow a=8$	M1A1]
		Total 8 marks

Question	Notes	Marks
7	The intersection of S with the y-axis is at the point with coordinates (0, 2). May be given as when $x = 0, y = 2$	B1
	For a correct statement for the volume, condone missing or incorrect limits and missing π $\left[y = x^2 + 2 \Rightarrow x^2 = y - 2\right]$ $V = \pi\int_2^a x^2 \ \mathrm{d}y \Rightarrow 18\pi = \pi\int_2^a (y-2) \ \mathrm{d}y$	M1
	METHOD A For an attempt to integrate the expression which must be in the minimally acceptable form $y \pm 2$ $18\pi = \pi\left[\frac{y^2}{2} - 2y\right]_2^a$ [Ignore limits and π for this mark]	M1
	For substituting the limits into their integrated expression to form an equation in a. No simplification is required for this mark. $18\pi = \pi\left[\left(\frac{a^2}{2} - 2a\right) - \left(\frac{2^2}{2} - 2\times 2\right)\right]$	M1
	For forming a 3TQ in terms of a $\quad 0 = a^2 - 4a - 32$	M1
	For the correct 3TQ $0 = a^2 - 4a - 32$	A1
	For an attempt to solve their 3TQ $a^2 - 4a - 32 = (a+4)(a-8) = 0 \Rightarrow a = ...$	M1
	For the correct value of $a = 8$ If $a = -4$ is also stated then it must be rejected.	A1 [8]
	METHOD B For an attempt to integrate the expression which must be in the minimally acceptable form $y \pm 2$ $18\pi = \pi\left[\frac{(y-2)^2}{2}\right]_2^a$ [Ignore limits and π for this mark]	M1
	For substituting the limits into their integrated expression to form an equation in a. No simplification is required for this mark. $18\pi = \pi\left[\left(\frac{a-2}{2}\right)^2 - \left(\frac{2-2}{2}\right)^2\right]$	M1
	For forming an equation in a $\quad 18 = \left(\frac{a-2}{2}\right)^2 \Rightarrow 36 = (a-2)^2$	M1A1
	For an attempt to solve their equation. $a = 2 \pm \sqrt{36} \Rightarrow a = 8$	M1A1

Total 8 marks