Question			Answer	Mark	AO	Guidance
6	(a)		Volume $= 4 = x^2h \Rightarrow h = \frac{4}{x^2}$ $[A =]x^2 + 4xh$ $\Rightarrow A = x^2 + 4x \cdot \left(\frac{4}{x^2}\right) = x^2 + \frac{16}{x}$ **AG**	**M1** **A1** **[2]**	**1.1** **1.1**	Using the given information to find h in terms of x Substituting for h to obtain AG correctly (must see an intermediate step)
6	(b)	(i)	$\left[\frac{dA}{dx} =\right] 2x - \frac{16}{x^2}$ $2x - \frac{16}{x^2} = 0$ $[x^3 = 8] \Rightarrow x = 2$ $A = 2^2 + \frac{16}{2} = 12$	**M1** **M1** **A1** **A1** **[4]**	**3.1a** **1.1** **1.1** **1.1**	Differentiating, condone sign errors for **M1** Set their $\frac{dA}{dx} = 0$, must be seen soi (but **A0** for any other incorrect values of x unless explicitly rejected) Must be correctly obtained from a correct derivative.
6	(b)	(ii)	$\left[\frac{d^2A}{dx^2} =\right] 2 + \frac{32}{x^3}$ $\frac{d^2A}{dx^2} > 0$ when $x = 2$, hence minimum	**M1** **A1**	**1.1** **2.2a**	FT their $\frac{dA}{dx}$, condone sign errors for **M1** www dep $x = 2$; no need to see actual value but must be obtained correctly i.e. $\frac{dA}{dx} = 2x + \frac{16}{x^2} \Rightarrow \frac{d^2A}{dx^2} = 2 + \frac{32}{x^3}$ (2x sign errors) is **A0** For reference if correct $\left[\frac{d^2A}{dx^2}\right]_{x=2} = 6$
			Alternative Method Attempt find $\frac{dA}{dx}$ or A either side of their $x = 2$ Correct values of $\frac{dA}{dx}$ or A for $x = 2 \pm$ hence min	 **M1** **A1**		 FT their value of x and their $\frac{dA}{dx}$ dep $x = 2$ www
				[2]		