Question	Answer	Marks	Partial Marks
8(c)	lg1500 = 3.2 or 3.17[60...]	**M1**	
	OR $x = \log_{their\,b}\left(\frac{1500}{their A}\right)$		**FT** *their A* and *b*
	OR $x = \frac{\lg 1500 - their \lg A}{their \lg b}$		**FT** *their* lg*A* and lg*b*
	awrt 6.2 to awrt 6.4 isw	**A1**	
9(a)	$[A=]\frac{1}{2}x^2 \times 0.5 + \frac{1}{2}(x+2)^2 \times 2 + \frac{1}{2}y^2[\times 1]$ soi	**B1**	
	[*P* =] $x + 0.5x + 2 + 2(x+2) + (x+2-y) + y + y$	**M1**	Attempts to form an expression in *x* and *y* for the perimeter using arc lengths and lengths of lines
	Equates *P* to 24 and rearranges: $y = 16 - \frac{9}{2}x$	**A1**	
	$A = \frac{5}{4}x^2 + 4x + 4 + 128 - 72x + \frac{81}{8}x^2$ oe leading to given answer $A = \frac{91}{8}x^2 - 68x + 132$	**A1**	
9(b)	$\frac{dA}{dx} = \frac{91}{4}x - 68$	**M1**	
	Solves $\frac{dA}{dx} = 0$ for *x*	**M1**	**FT** *their* $\frac{dA}{dx}$ providing at least one term is correct
	$x = \frac{272}{91}$ or $2\frac{90}{91}$ or 2.99 or 2.989[01...] rot to 4 or more sf	**A1**	
	$A = \frac{91}{8}\left(\frac{272}{91}\right)^2 - 68\left(\frac{272}{91}\right) + 132$	**M1**	**FT** *their x*
	$A = \frac{2764}{91}$ or $30\frac{34}{91}$ or 30.4 or 30.37[36...] rot to 4 or more sf	**A1**	

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Question	Answer	Marks	Partial Marks
10(a)	$a^n = b^4$ and $na^{n-1}\left(\frac{1}{a}\right) = 48b^3$ oe	**M1**	
	Eliminates b from one equation using the other equation e.g. $\frac{a^{n-2}}{a^{\frac{3}{4}n}} = \frac{48}{n}$	**M1**	**dep** previous **M1**
	Simplifies a terms e.g. $a^{\frac{n}{4}-2} = \frac{48}{n}$ or $a^{\frac{3n}{4}-6} = \left(\frac{48}{n}\right)^3$	**A1**	
	Uses an appropriate power and completes to the given form e.g. $\left(a^{\frac{n}{4}-2}\right)^2 = \left(\frac{48}{n}\right)^2$ or $\left(a^{\frac{3n}{4}-6}\right)^{\frac{2}{3}} = \left(\frac{48}{n}\right)^{3\times\frac{2}{3}}$ → $a^{\frac{n}{2}-4} = \left(\frac{48}{n}\right)^2$	**A1**	
10(b)	Correct equation in a, b, n $\frac{n(n-1)}{2} \times a^{n-2} \times \frac{1}{a^2} = 1056b^2$ oe, soi	**M1**	
	Correct equation in a, n $\frac{n(n-1)}{2} \times a^{n-2} \times \frac{1}{a^2} = 1056a^{\frac{n}{2}}$ oe	**A1**	
	$\left[\frac{n(n-1)}{2} \times a^{\frac{n}{2}-4} = 1056 \text{ oe} \rightarrow\right]$ Correct equation in n only $\frac{n(n-1)}{2} \times \left(\frac{48}{n}\right)^2 = 1056$ oe	**A1**	
	$n^2 - 12n = 0$ or $n - 12 = 0$ oe	**A1**	
	$n = 12$ only	**A1**	
	$a = 4$ only and $b = 64$ only	**A1**	

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