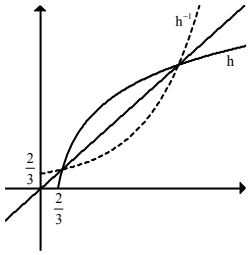
Question	Answer	Marks	Partial Marks
9	$\frac{\mathrm{d}(\mathrm{e}^{3x})}{\mathrm{d}x} = 3\mathrm{e}^{3x}$ soi	**B1**	
	Applies product rule to e.g. numerator: *their*$(3\mathrm{e}^{3x})\sin x + \mathrm{e}^{3x}\cos x$	**M1**	or to $x^{-2}\sin x$: $x^{-2}\cos x + (-2x^{-3})\sin x$ or to $\mathrm{e}^{3x} \times x^{-2}$: $\mathrm{e}^{3x} \times (-2x^{-3}) + \textit{their}(3\mathrm{e}^{3x}) \times x^{-2}$
	Correct quotient rule: $\frac{x^2\left(\textit{their}\left(3\mathrm{e}^{3x}\sin x + \mathrm{e}^{3x}\cos x\right)\right) - 2x(\mathrm{e}^{3x}\sin x)}{x^4}$	**M1**	or applies product rule for a second time e.g. : $x^{-2}(\textit{their}\left(3\mathrm{e}^{3x}\right)\sin x + \mathrm{e}^{3x}\cos x) +$ $(-2x^{-3})(\mathrm{e}^{3x}\sin x)$
	Fully correct derivative; isw	**A1**	
	$\delta y = \textit{their}\left(\left.\frac{\mathrm{d}y}{\mathrm{d}x}\right\|_{x=0.5}\right) \times h$	**M1**	
	7.14*h* or 7.137[66...]*h* with coefficient rot to 4 or more figs isw	**A1**	Answer only, without working, scores **SC1**
10(a)(i)	Correct method to find inverse	**M1**	
	$\mathrm{g}^{-1}(x) = \frac{1}{x-3}$ oe	**A1**	
10(a)(ii)	$\mathrm{g}^{-1} \geqslant 1$ or $[1, \infty)$	**B1**	
10(a)(iii)	$3 < x \leqslant 4$ or $(3, 4]$	**B2**	**B1** for 3 and 4 in an incorrect inequality or for $x > 3$ or $x \leqslant 4$

Question	Answer	Marks	Partial Marks
10(b)	Correct graph for h	**B1**	
	h^{-1} the reflection of h in $y = x$	**B1**	**FT** *their* h
	Both graphs drawn over the correct domain	**B1**	**FT** *their* h and h^{-1}
		**B1**	Correct graphs intersecting twice
11	$h = \frac{1000}{\pi r^2}$ or $r = \sqrt{\frac{1000}{\pi h}}$ soi	**B1**	
	$S = \pi r^2 + 2\pi r\left(\frac{1000}{\pi r^2}\right)$ oe or $S = \pi\left(\frac{1000}{\pi h}\right) + 2\pi\sqrt{\frac{1000}{\pi h}}(h)$ oe	**M1**	
	$S = \pi r^2 + 2\left(\frac{1000}{r}\right)$ or better or $S = \frac{1000}{h} + 2\pi\sqrt{\frac{1000}{\pi}}\left(h^{\frac{1}{2}}\right)$	**A1**	
	$\frac{dS}{dr} = 2\pi r - 2000r^{-2}$ or $\frac{dS}{dh} = -1000h^{-2} + \sqrt{1000\pi}\,h^{-\frac{1}{2}}$	**B2**	**B1 FT** for each term correct
	$\frac{dS}{dr} = 0, \quad r^3 = \frac{1000}{\pi}$ oe or $\frac{dS}{dh} = 0, \quad h^{\frac{3}{2}} = \sqrt{\frac{1000}{\pi}}$ oe	**M1**	
	$S = \pi\left(\sqrt[3]{\frac{1000}{\pi}}\right)^2 + \frac{2000}{\sqrt[3]{\frac{1000}{\pi}}}$ or $S = \frac{1000}{\sqrt[3]{\frac{1000}{\pi}}} + 2\sqrt{1000\pi}\left(\sqrt[3]{\frac{1000}{\pi}}\right)^{\frac{1}{2}}$	**M1**	
	439 or 439.3 to 439.4	**A1**	