Question	Answer	Marks	Partial Marks
10(b)(i)	$\frac{\mathrm{d}(\sin 4x)}{\mathrm{d}x} = 4\cos 4x$ soi	**B1**	
	Applies correct form of product rule: $4x\cos 4x + [1]\sin 4x$ isw	**B1**	**FT** *their* $4\cos 4x$ if possible
10(b)(ii)	$\left[\int (4x\cos 4x)\,\mathrm{d}x = \right] x\sin 4x - \int \sin 4x\,\mathrm{d}x$	**M1**	**FT** use of *their* $mx\cos 4x + n\sin 4x$ where m and n are constants
	$x\sin 4x + \frac{1}{4}\cos 4x[+c]$ soi	**A1**	
	$\frac{\pi}{3}\sin\left(4\times\frac{\pi}{3}\right)+\frac{1}{4}\cos\left(4\times\frac{\pi}{3}\right)-$ $\left[\frac{\pi}{4}\sin\left(4\times\frac{\pi}{4}\right)+\frac{1}{4}\cos\left(4\times\frac{\pi}{4}\right)\right]$	**A1**	
	Correct completion to **given answer** $\frac{1}{8}-\frac{\pi\sqrt{3}}{6}$	**A1**	
11(a)	$500 = \frac{4}{6}\pi x^3 + \pi x^2 y$ oe	**M1**	
	$y = \frac{1}{\pi x^2}\left(500 - \frac{4}{6}\pi x^3\right)$ oe, isw	**A1**	if first **M0**, **SC1** for $y = \frac{1}{\pi x^2}\left(500 - \frac{4}{3}\pi x^3\right)$ oe seen
	$S = 2\pi x^2 + \pi x^2 + 2\pi x\left(\frac{500}{\pi x^2} - \frac{2}{3}x\right)$	**M1**	**dep** on first **M1**
	Correct completion to given answer: $S = \frac{5}{3}\pi x^2 + \frac{1000}{x}$	**A1**	
11(b)	Differentiates S: $\frac{10}{3}\pi x - \frac{1000}{x^2}$ oe	**B2**	**B1** for each term
	$\frac{10}{3}\pi x - \frac{1000}{x^2} = 0$ and attempt to solve	**M1**	**FT** *their* $\frac{\mathrm{d}S}{\mathrm{d}x}$ providing at least **B1** awarded
	$x = \sqrt[3]{\frac{300}{\pi}}$ isw or 4.57[07...] nfww	**A1**	
12(a)(i)	$A(0,1)$ and $B(1, 0)$	**B1**	

Question	Answer	Marks	Partial Marks
12(a)(ii)	$[y=]\frac{1}{2(2)+1}$ and $[y=]\frac{2-1}{5}$ **and** evaluates both expressions as $\frac{1}{5}$	**B2**	**B1** for $[y=]\frac{1}{2(2)+1}$ **and** $5y=2-1$ oe
	Alternative 1 $[y=]\frac{1}{2(2)+1}=\frac{1}{5}$ or $[y=]\frac{2-1}{5}=\frac{1}{5}$ **and** solves $5\times\frac{1}{5}=x-1$ oe to get $x = 2$ or $\frac{1}{5}=\frac{1}{2x+1}$ oe to get $x = 2$	**(B2)**	**B1** for $\frac{1}{2(2)+1}=\frac{1}{5}$ and $5\times\frac{1}{5}=x-1$ oe or $\frac{2-1}{5}=\frac{1}{5}$ and $\frac{1}{5}=\frac{1}{2x+1}$ oe
	Alternative 2 $2x^2 - x - 6 = 0$ **and** solves or factorises to get $(2x + 3)(x – 2)$ and states $x = 2$ OR shows $2(2^2) – 2 – 6 = 0$ oe	**(B2)**	**B1** for $(2x + 1)(x – 1) = 5$ or $2x^2 - x - 6 = 0$
	Alternative 3 $(2x + 1)(x – 1) = 5$ oe **and** shows $(2 \times 2 + 1)(2 – 1) = 5$	**(B2)**	**B1** for $(2x + 1)(x – 1) = 5$
12(b)	$\frac{1}{2}\times1\times0.2$ oe or $\frac{2^2}{5\times2}-\frac{2}{5}-\left(\frac{1^2}{5\times2}-\frac{1}{5}\right)$ oe	**B1**	
	$[F(x)=]\ \frac{1}{2}\ln(2x+1)\ [+c]$ oe or $\frac{1}{2}\ln(x+0.5)\ [+c]$ oe	**B2**	**B1** for $\frac{1}{2}\ln 2x+1$ or $\frac{1}{2}\ln x+0.5$ or $k\ln(2x+1)$ or $k\ln(x+0.5)$, $k \neq 0.5$ or 0
	F(2) – F(0) – *their* 0.1	**M1**	**FT** *their* F(x) providing at least **B1** for integration of curve awarded
	$0.5\ln5-0.1$ or exact equivalent	**A1**	

Question	Answer	Marks	Partial Marks
13(a)	$[\text{fg}(x) =] \dfrac{2\left(\dfrac{1}{x}\right)^2 - 1}{3\left(\dfrac{1}{x}\right)}$ oe	**M1**	
	$[\text{fg}(x) =] \dfrac{2 - x^2}{3x}$ or $\dfrac{2}{3x} - \dfrac{x}{3}$	**A1**	mark final answer
13(b)(i)	$\text{f}^{-1} > 0$	**B1**	
13(b)(ii)	$2x^2 - 3xy - 1 = 0$ or $2y^2 - 3xy - 1 = 0$	**B1**	
	Correctly applies quadratic formula: $[x =] \dfrac{-(-3y) \pm \sqrt{(-3y)^2 - 4(2)(-1)}}{2(2)}$ oe or $[y =] \dfrac{-(-3x) \pm \sqrt{(-3x)^2 - 4(2)(-1)}}{2(2)}$ oe	**M1**	**FT** *their* $2x^2 - 3xy - 1 = 0$ or $2y^2 - 3xy - 1 = 0$ with at most one sign error in the equation
	Justifies the positive square root at some point	**B1**	
	$\text{f}^{-1}(x) = \dfrac{3x + \sqrt{9x^2 + 8}}{4}$ cao	**A1**	must be a function of x