Question	Answer	Marks	Partial Marks
3(b)(ii)	$\frac{2\pi}{3}$ oe or 2.09 or 2.094[395…] rot to 4 or more sf	**B1**	
4(a)	$2x-3=6^{\frac{1}{2}}$ oe, soi	**M1**	
	$x=\frac{6^{\frac{1}{2}}+3}{2}$ or $x=\frac{\sqrt{6}+3}{2}$	**A1**	
4(b)	$\ln\frac{2u}{u-4}=\ln e$ soi or $\ln\frac{2u}{u-4}=1$ soi or $\ln 2u=\ln e(u-4)$ soi	**M1**	Condone one sign or bracketing error
	$\frac{2u}{u-4}=e$ or $2u=e(u-4)$ oe	**M1**	**FT** *their* logarithmic equation
	$u=\frac{4e}{e-2}$ or $u=\frac{-4e}{2-e}$ or equivalent exact form	**A1**	
4(c)	$\frac{3^v}{\left(3^3\right)^{2v-5}}=3^2$ oe soi or $\frac{9^{\frac{v}{2}}}{\left(9^{\frac{3}{2}}\right)^{2v-5}}=9$ oe soi or $\log 3^v-\log 27^{2v-5}=\log 9$ oe soi	**B1**	
	$15-5v=2$ oe or $v\log 3-(2v-5)\log 27=\log 9$	**M1**	**FT** *their* exponential equation in the same base or *their* logarithmic equation with any consistent base, providing *their* exponential or logarithmic equation has at most one sign or arithmetic error
	$v=\frac{13}{5}$ oe	**A1**	

Question	Answer	Marks	Partial Marks
5(a)	$\frac{\sin x}{1-\sin x}+\frac{\sin x}{1+\sin x}$ or $\frac{\operatorname{cosec} x+1+\operatorname{cosec} x-1}{\operatorname{cosec}^2 x-1}$ oe	**M1**	
	$\frac{\sin x+\sin^2 x+\sin x-\sin^2 x}{1-\sin^2 x}$ or $\frac{2\operatorname{cosec} x}{\cot^2 x}$ oe	**A1**	
	$\frac{2\sin x}{\cos^2 x}$ or $\frac{2\sin^2 x}{\sin x\cos^2 x}$ oe	**A1**	
	Fully correct justification of given answer: $\frac{2\sin x}{\cos x}\times\frac{1}{\cos x}=2\tan x\sec x$ or $2\tan x\times\frac{1}{\cos x}=2\tan x\sec x$ or $\frac{2\sin x}{\cos x}\times\sec x=2\tan x\sec x$ or equivalent	**A1**	
5(b)	$2\tan^2 x=5$ or better, soi or $7\cos^2 x=2$ or better, soi or $7\sin^2 x=5$ or better, soi	**B1**	
	$\tan x=[\pm]\sqrt{\frac{5}{2}}$ oe or [±] 1.58[1…] or $\cos x=[\pm]\sqrt{\frac{2}{7}}$ oe or [±] 0.534[5…] or $\sin x=[\pm]\sqrt{\frac{5}{7}}$ oe or [±] 0.845[1…]	**M1**	**FT** an equation of the form $a\tan^2 x=b$ $a>0, b>0$ or $p\sin^2 x=q$ or $p\cos^2 x=q$ where $p>0$, $q>0$ and $p>q$
	57.7 or 57.6884… rot to 2 or more dp 237.7 or 237.6884… rot to 2 or more dp 122.3 or 122.3115… rot to 2 or more dp 302.3 or 302.3115… rot to 2 or more dp	**A2**	no extras in range **A1** for any two correct answers
6(a)	$y=(x-2)^2+4$ oe, isw	**B2**	**B1** for a correct expression in x and y only, that is not of the form $y=\mathrm{f}(x)$
6(b)	$\left[\frac{\mathrm{d}y}{\mathrm{d}x}=\right]2(x-2)$ oe	**B1**	**dep** on **B2** in **(a)**