Question	Answer	Marks	Partial Marks
9(c)	$3x^2 - 4xy + y[=0]$ or $3y^2 - 4xy + x[=0]$	**B1**	
	$[x =]\dfrac{-(-4y) \pm \sqrt{(-4y)^2 - 4(3)(y)}}{2(3)}$ oe or $[y =]\dfrac{-(-4x) \pm \sqrt{(-4x)^2 - 4(3)(x)}}{2(3)}$ oe	**M1**	**FT** *their* expression providing it has at most one sign error
	Justifies the negative square root	**B1**	
	$f^{-1}(x) = \dfrac{2x - \sqrt{x(4x-3)}}{3}$	**A1**	
10(a)	$\tan^2 x + 2\tan x \sec x + \sec^2 x$ or $\left(\dfrac{\sin x}{\cos x} + \dfrac{1}{\cos x}\right)^2$	**M1**	
	$\dfrac{\sin^2 x}{\cos^2 x} + 2 \times \dfrac{\sin x}{\cos x} \times \dfrac{1}{\cos x} + \dfrac{1}{\cos^2 x}$ or factorises $\dfrac{1}{\cos^2 x}(\sin x + 1)^2$ oe	**A1**	
	$\dfrac{(1+\sin x)^2}{1-\sin^2 x}$	**A1**	
	$\dfrac{(1+\sin x)(1+\sin x)}{(1-\sin x)(1+\sin x)} = \dfrac{1+\sin x}{1-\sin x}$ or $\dfrac{(1+\sin x)^2}{(1-\sin x)(1+\sin x)} = \dfrac{1+\sin x}{1-\sin x}$	**A1**	must be fully justified
10(b)	$7\sin 3\theta = 5$	**B1**	
	One correct value for 3θ soi e.g. 45.58… 134.4… 405.5… 494.4…	**M1**	
	15.2 or 15.19 to 15.195 44.8 or 44.80 to 44.81 135.2 or 135.19 to 135.195 164.8 or 164.80 to 164.81	**A2**	with no extras in range **A1** for any 2 correct, ignoring extras

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Question	Answer	Marks	Partial Marks
11	$P = 2\left(\frac{\pi x}{4}\right) + x + 2\left(\frac{400}{x} - \frac{x}{2}\right)$ oe	**B2**	**B1** for rectangle length = $\frac{400}{x}$ soi
	Correct first derivative $\frac{\pi}{2} - \frac{800}{x^2}$	**B1**	**FT** *their P* providing it is of the form $\frac{a}{x} + bx$ oe with *a* an integer and *b* a constant
	Equates *their* $\frac{dP}{dx}$ to 0 and solves for *x*	**M1**	**FT** provided one term of *their* derivative is correct
	$x = \frac{40}{\sqrt{\pi}}$ or 22.6 or 22.56[75...]	**A1**	
	$P = \frac{\pi}{2}\left(\frac{40}{\sqrt{\pi}}\right) + \frac{800}{\frac{40}{\sqrt{\pi}}}$	**M1**	**FT** *their* value of *x* provided it is greater than 0
	P = 70.9 or 70.89[81...]	**A1**	
12(a)	$\overrightarrow{OP} = \frac{4}{7}\mathbf{b} + \lambda\left(\mathbf{c} - \frac{4}{7}\mathbf{b}\right)$ and $\overrightarrow{OP} = \mathbf{b} + \mu\left(\frac{4}{7}\mathbf{c} - \mathbf{b}\right)$	**B3**	**B2** for $\overrightarrow{OP} = \frac{4}{7}\mathbf{b} + \lambda\left(\mathbf{c} - \frac{4}{7}\mathbf{b}\right)$ or $\overrightarrow{OP} = \mathbf{b} + \mu\left(\frac{4}{7}\mathbf{c} - \mathbf{b}\right)$ oe or **B1** for $\overrightarrow{OP} = \left(their\,\frac{4}{7}\right)\mathbf{b} + \lambda\left(\mathbf{c} - \left(their\,\frac{4}{7}\right)\mathbf{b}\right)$ or $\overrightarrow{OP} = \mathbf{b} + \mu\left(\left(their\,\frac{4}{7}\right)\mathbf{c} - \mathbf{b}\right)$ or
	Equates components e.g.: $\left(their\,\frac{4}{7}\right)(1-\lambda) = (1-\mu)$ or $\lambda = their\,\frac{4}{7}\mu$	**M1**	**FT** providing at least **B1** awarded and two expressions for $\overrightarrow{OP}$ in terms of **b, c**, λ and μ found
	$\frac{4}{7}(1-\lambda) = (1-\mu) \quad \lambda = \frac{4}{7}\mu$ oe	**A1**	
	$\lambda = \frac{4}{11}$ and $\mu = \frac{7}{11}$ oe and conclusion $AP : AC$ = 4 : 11 therefore $AP : PC$ = 4 : 7 $BP : BD$ = 7 : 11 therefore $DP : PB$ = 4 : 7 oe	**A2**	**A1** for $\lambda = \frac{4}{11}$ or $\mu = \frac{7}{11}$ oe

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