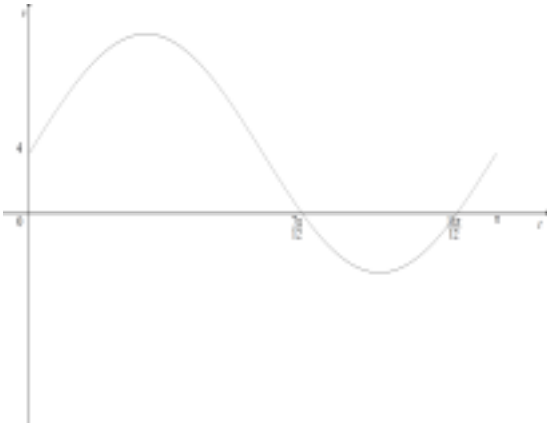
Question	Answer	Marks	Guidance
7(b)	$\frac{(n+1)!}{(n-12)!13!} = \frac{16n!}{(n-12)!12!}$ soi	**B1**	
	$n+1 = 13\times16$ oe	**B1**	**Dep** on previous **B** mark for either $n+1$ or 13×16
	$n = 207$	**B1**	**Dep** on previous 2 **B** marks
8	When $x=2$, $y=12$	**B1**	
	$\frac{dy}{dx} = \frac{15}{2}(5x+6)^{-\frac{1}{2}}$	**2**	**M1** for $k(5x+6)^{-\frac{1}{2}}$, $k \neq \frac{15}{2}$
	When $x=2$, $\frac{dy}{dx} = \frac{15}{8}$,	**A1**	
	perp gradient = $-\frac{8}{15}$	**M1**	**Dep** on previous **M** mark. Allow for use of *their* gradient to obtain perp gradient
	Normal equation: $y-12 = -\frac{8}{15}(x-2)$	**M1**	Allow for using *their* perp gradient and *their y*
	When $x=-2$ $k = \frac{212}{15}$ or $14\frac{2}{15}$	**A1**	
9(a)	$v = 4+8\sin 2t$	**2**	**M1** for $v = 4+k\sin 2t$, $k \neq 8$
9(b)		**5**	**B1** for a complete correct cycle between $t=0$ and $t=\pi$ **B1** for $v=4$, must have a sine curve **M1** for correct attempt to find one *t*-intercept using their *v*, must be in the form $4+k\sin 2t$ and $0<t<\pi$ Allow **M1** for 105^o or 165^o seen **A1** for $t = \frac{7\pi}{12}$ **A1** for $t = \frac{11\pi}{12}$
9(c)	$a = 16\cos 2t$	**B1**	**FT** on *their v* which must be in the form $4+k\sin 2t$
9(d)	$t = \frac{\pi}{4}$, $\frac{3\pi}{4}$	**2**	**B1** for each Must be from $\cos 2t = 0$

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Question	Answer	Marks	Guidance
10(a)(i)	$a+d=14$ soi	**B1**	
	$a(a+d)(a+2d)=-6720$	**B1**	
	$a\times14\times(a+2d)=-6720$, leading to $a(a+2d)=-480$	**B1**	**Dep** on both previous **B** marks **AG**, needs sufficient detail
10(a)(ii)	$(14-d)(14+d)=-480$ or $a(28-a)=-480$	**M1**	For attempt to obtain a quadratic equation in one variable
	$d^2=676$ or $a^2-28a-480=0$	**A1**	
	$a=40,\ d=-26$	**A2**	**A1** for each
10(b)	$ar^2=\dfrac{e^{4x}}{4}$	**B1**	
	$ar^9=\dfrac{e^{11x}}{512}$	**B1**	
	$r^7=\dfrac{e^{7x}}{128}$ oe	**M1**	For a correct attempt to solve *their* 2 equations. Must be the same structure to obtain $r^7=...$
	$r=\dfrac{e^x}{2}$	**A1**	
	$a=e^{2x}$	**A1**	

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