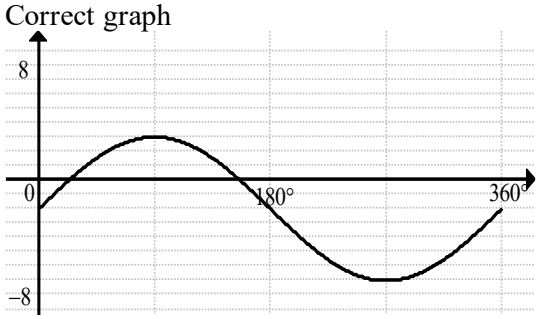
Question	Answer	Marks	Partial Marks
3(c)	gradient of radius $= \frac{-3+1}{4-3} = -2$ soi by gradient of tangent	**M1**	
	gradient of tangent $= \frac{-1}{their(-2)}$	**M1**	**FT** *their* –2 Allow if differentiation is used e.g.:
	$y + 1 = \frac{1}{2}(x - 3)$ oe	**A1**	**FT** $\frac{-1}{their - 2}$ ISW from a correct unsimplified answer
	Alternative		
	use of differentiation e.g.: $(y+3)^2 = 5-(x-4)^2$ $y = \sqrt{-x^2+8x-11} - 3$ $\frac{dy}{dx} = \frac{-2x+8}{2\sqrt{-x^2+8x-11}}$	**(M1)**	allow one error or use of implicit differentiation (not on syllabus) e.g.: $2x + 2y\frac{dy}{dx} - 8 + 6\frac{dy}{dx} = 0$ leading to $\frac{dy}{dx} = \frac{8-2x}{2y+6}$
	Substitute $(3,-1)$ in *their* $\frac{dy}{dx}$ to get gradient $= \frac{1}{2}$	**(M1)**	**Dep** on first **M1**
	$y + 1 = \frac{1}{2}(x - 3)$ oe	**(A1)**	ISW from a correct unsimplified answer
4(a)	Solves or factorises $x^{\frac{1}{3}} - x^{\frac{1}{6}} - 2 = 0$ oe: $\left(x^{\frac{1}{6}}+1\right)\left(x^{\frac{1}{6}}-2\right)$ or when substituting $y = x^{\frac{1}{3}}$ factorises to $\left(y^{\frac{1}{2}}+1\right)\left(y^{\frac{1}{2}}-2\right)$	**M1**	A substitution may be used $\left(x^{\frac{1}{3}}\right)^6 - \left(x^{\frac{1}{6}}\right)^6 = 2^6$ scores 0 marks $\left(x^{\frac{1}{3}}\right) - \left(x^{\frac{1}{6}}\right) = x^{\log_x 2}$ then $\frac{1}{3} - \frac{1}{6} = \log_x 2$ scores 0 marks
	$\left[x^{\frac{1}{6}} = -1\right]$, $x^{\frac{1}{6}} = 2$	**A1**	
	$x = 64$ [$x = 1$]	**A1**	
	Rejects $x^{\frac{1}{6}} = -1$ or $x = 1$ ignored at some stage, soi	**B1**	

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Question	Answer	Marks	Partial Marks
4(b)	$x+2y=1$	**B1**	
	Correctly eliminates one unknown	**M1**	**Dep** on **B1** allow unsimplified e.g. $x=1-2y$ or $y=\frac{1-x^2}{4x+1}$
	Correct quadratic in solvable form: $y-4y^2\,[=0]$ oe or $2x^2-3x+1[=0]$ oe	**A1**	
	Factorises or solves *their* quadratic to get two solutions	**M1**	**Dep** on previous **M1**
	$y = 0$, $x = 1$ and $y = \frac{1}{4}$, $x = \frac{1}{2}$	**A1**	
5(a)	$2x – 1 = –3$ and $2x – 1 = 3$	**M1**	
	$x = 2$, $x = –1$	**A2**	**A1** for either correct
	Alternative		
	$4x^2-4x-8=0$ oe	**(B1)**	
	Solves or factorises *their* 3-term quadratic	**(M1)**	
	$x = –1$, 2	**(A1)**	
5(b)	Correct graph 	**2**	**B1** for a correct sine curve one cycle **and** with correct amplitude at 3 and –7 **B1** for a correct sine curve one cycle **and** with correct midline $y = –2$