Question	Answer	Marks	Guidance
5(c)	$\text{cosec}2\theta = -3$ soi	**B1**	
	$\sin 2\theta = -\frac{1}{3}$ $2\theta = -19.47^o, 199.47^o, 340.53^o, 559.47^o, 700.53^o$ $\theta = 99.7^o, 170.3^o, 279.7^o, 350.3^o$	**4**	**M1** a correct double angle **M1** for correct order of operations to obtain one correct solution. May be implied by e.g. a correct solution or $\theta = -9.7^o$ or a correct angle in radians **A1** for 2 correct solutions **A1** for a further 2 correct solutions and no extra solutions within the range
6(a)(i)	$300 + \frac{1}{2}(10+V)40 + \frac{1}{2}50V = 2750$ or $700 + \frac{1}{2}(40\times(V-10)) + \frac{1}{2}50V = 2750$ oe	**M1**	Allow one slip, but must be considering complete area
	$V = 50$	**A1**	
6(a)(ii)	–1 nfww	**2**	**M1 FT** *their V* for a correct gradient calculation
6(b)(i)	$\left(\frac{dv}{dt} =\right)\ t\left(\frac{1}{2}\times 2t\times\left(t^2+5\right)^{-\frac{1}{2}}\right)+\left(t^2+5\right)^{\frac{1}{2}}$ soi	**3**	**B1** for $\frac{1}{2}\times 2t\times\left(t^2+5\right)^{-\frac{1}{2}}$ **M1** for a correct attempt at a product **A1** for all correct apart from $\frac{1}{2}\times 2t\times\left(t^2+5\right)^{-\frac{1}{2}}$
	$\frac{13}{3}$	**A1**	
6(b)(ii)	There is no change of sign for *v* as *v* is always positive, so no change in direction. oe	**B1**	
7(a)	$a(5x-2)^{\frac{1}{3}}$	**M1**	
	$\frac{3}{5}(5x-2)^{\frac{1}{3}}$ oe	**A1**	
	$\frac{3}{5}\left(18^{\frac{1}{3}}-2\right)$ or exact equivalent	**2**	**Dependent M1** for correct use of limits

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Question	Answer	Marks	Guidance
7(b)	$2\ln(2x+1)$ oe	**B1**	
	$-\frac{4}{2x+1}$ oe	**B1**	
	$\left(2\ln 2-\frac{4}{2}\right)-(-4)$	**M1**	For correct substitution of limits, must be using the form $a\ln(2x+1)+\frac{b}{2x+1}$
	$\ln 4+2$	**2**	**A1** for each term
8(a)(i)	15 120	**B1**	
8(a)(ii)	Total: 3780	**3**	**B1**: Starts with 5, 7 or 9: 2520 soi **B1**: Starts with 6 or 8: 1260 soi
	Alternative		
	Total: 3780	**(3)**	**B1**: Ends with 2 or 4: 2100 soi **B1**: Ends with 6 or 8: 1680 soi
8(b)	2 nurses, 2 dentists, 5 doctors = 36 2 nurses, 3 dentists, 4 doctors = 60 2 nurses, 4 dentists, 3 doctors = 20	**2**	**M1** for two correct cases
	Total = 116	**A1**	
	Alternative		
	1 dentist only = 4 No nurses = 10 1 nurse only = 90	**(M1)**	
	Total = 116	**(2)**	**M1** for attempt to subtract at least 2 correct cases from 220
9(a)(i)	$d=3\lg\theta$	**B1**	
	$\frac{n}{2}\left(2(2\lg\theta)+(n-1)3\lg\theta\right)=4732\lg\theta$	**M1**	For use of the sum formula to obtain an equation in $\lg\theta$ only, using *their a* and *d* and $4732\lg\theta$
	$3n^2+n-9464=0$	**A1**	
	$n=56$ only	**2**	**M1** for attempt to solve *their* quadratic equation in *n*
9(a)(ii)	0.001 oe	**B1**	

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