Question	Answer	Marks	Partial marks
10(a)	$1.1^n * 3$	**B2**	where * is any inequality sign or = **B1** for $\frac{10\left(1.1^n-1\right)}{1.1-1} * 200$ or $\frac{10\left(1-1.1^n\right)}{1-1.1} * 200$ or for $r = 1.1$ soi
	$n\log 1.1 * \log 3$ oe or $\log_{1.1} 3$ [* n]	**M1**	**FT** $1.1^n * \textit{their}3$ providing **B1** has been awarded for a correct sum to n terms **and** (*their* 3) > 0
	[n =]12	**A1**	**dep** on all previous marks awarded
10(b)	$r = 2$ only nfww	**B4**	**B3** for a correct equation or equations which can be solved directly for r e.g. $[d =]\frac{[a](r-1)}{2} = \frac{[a]r(r-1)}{4}$ or $[d =]\frac{[a](r-1)}{2} = \frac{[a](r^2-1)}{6}$ or $[a](r^2 - 3r + 2)$ [= 0] oe or $\frac{2(r+1)(r-1)}{(r-1)} = 6$ or $r = \frac{4d}{2d}$ or $[r =]\frac{a+2d}{a}$ or $[r =]\frac{a+6d}{a+2d}$ **and** $a = 2d$ or **B2** for a correct equation or equations which need to be rearranged to find r e.g. $[d =]\frac{ar-a}{2} = \frac{ar^2-ar}{4}$ or $[d =]\frac{ar-a}{2} = \frac{ar^2-a}{6}$ or $[a =]\frac{6[d]}{r^2-1} = \frac{2[d]}{r-1}$ or $a(r-1) = 2d$ and $ar(r-1) = 4d$ or **either** $[r =]\frac{a+2d}{a}$ or $[r =]\frac{a+6d}{a+2d}$ **and** $4d^2 - 2ad$ [= 0] or **B1** for $ar = a + 2d$ oe and **B1** for $ar^2 = a + 6d$ oe

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Question	Answer	Marks	Partial marks
11(a)(i)	12	**2**	**B1** for 3! × 2! or ${}^2P_2 \times {}^3P_3$ oe
11(a)(ii)	72	**2**	**B1** for 5! − 4! × 2! oe or 6 × 2! × 3! oe
11(b)	4200	**2**	**B1** for ${}^{10}C_3 \times {}^7C_3 \left[\times {}^4C_4\right]$ oe or ${}^{10}C_4 \times {}^6C_3 \left[\times {}^3C_3\right]$ oe
12(a)	Correct derivative: $-\sin t - \cos t$	**M1**	
	$-\frac{1+\sqrt{3}}{2}$ oe or −1.37 or –1.366[02…] rot to 3 or more dp	**A1**	Mark **final answer**
12(b)	[$v = 0 \Rightarrow$] $\cos t - \sin t = 0$ $t = \frac{\pi}{4}$	**B2**	**B1** for $\cos t - \sin t = 0$
	Correct integral: $\sin t + \cos t$ (+ c)	**M1**	
	$0 = \sin 0 + \cos 0 + c$	**M1**	**FT** *their* attempt to integrate
	$s = \sin t + \cos t - 1$	**A1**	
	$\sqrt{2} - 1$ oe, isw or 0.414[21…]	**A1**	**dep** on all previous marks awarded
	Alternative		
	[$v = 0 \Rightarrow$] $\cos t - \sin t = 0$ $\rightarrow t = \frac{\pi}{4}$	**(B2)**	**B1** for $\cos t - \sin t = 0$
	Correct integral: $\sin t + \cos t$	**(M1)**	
	with limits $t = \frac{\pi}{4}$ and $t = 0$	**(A1)**	Must be in radians
	Substitutes limits into correct integral	**(M1)**	**FT** *their* $t = \frac{\pi}{4}$ from attempt at solving $v = 0$
	$\sqrt{2} - 1$ oe, isw or 0.414[21…]	**(A1)**	**dep** on all previous marks awarded
12(c)	$-s - 1$ oe isw	**B1**	

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