Question	Answer	Marks	Partial Marks
6(a)	8400	**2**	**M1** for $5 \times 8 \times 7 \times 6 \times 5$ oe
6(b)(i)	3 628 800	**2**	**M1** for $7! \times 6!$
6(b)(ii)	1266	**2**	**M1** for ${}^{13}C_5 - {}^{7}C_5$
7(a)	–729 729	**2**	**B1** for ${}^{15}C_5 \left(x^2\right)^{10} \left(-\frac{3}{x^4}\right)^5$ oe
7(b)	$\frac{9(8)(7)}{6}a^3 = 7 \times \frac{9(8)}{2}a^2$ oe	**M2**	**M1** for $\frac{9(8)(7)}{6}a^3[x^3]$ oe or $\frac{9(8)}{2}a^2\left[x^2\right]$ oe
	$a = 3$ nfww	**A1**	
8(a)	$\frac{\mathrm{d}y}{\mathrm{d}x} = 3\mathrm{e}^{3x+2}\tan x + \mathrm{e}^{3x+2}\sec^2 x$	**3**	**B1** for $\frac{\mathrm{d}(\mathrm{e}^{3x+2})}{\mathrm{d}x} = 3\mathrm{e}^{3x+2}$ **M1** for correct structure of product rule **A1 FT** *their* $\frac{\mathrm{d}(\mathrm{e}^{3x+2})}{\mathrm{d}x} = 3\mathrm{e}^{3x+2}$ for all other components of product rule correct
	Correct small changes relationship e.g. $\frac{\delta y}{h} = \textit{their}\left.\frac{\mathrm{d}y}{\mathrm{d}x}\right\|_{x=0.1}$	**M1**	
	$13.1h$ or $13.07[68\ldots]h$	**A1**	**dep** on first three marks awarded
8(b)	$y:\ -\frac{1}{3}\cos(3x+\pi) + c$	**B2**	**B1** for $-\frac{1}{3}\cos(3x+\pi)$ or for $k\cos(3x+\pi) + c$ where k is $\frac{1}{3}$ or $k < 0$
	$\frac{4}{3} = -\frac{1}{3}\cos\left(\frac{3\pi}{9}+\pi\right) + c$	**M1**	**FT** *their k* providing **B1** has been awarded
	$\left[y = -\frac{1}{3}\cos\left(\frac{5\pi}{4}+\pi\right) + \frac{7}{6} =\right]\ \ \frac{7-\sqrt{2}}{6}$ or exact equivalent	**A1**	
9(a)	$n = 31$ OR $n = \frac{150+d}{d}$	**2**	**M1** for $\frac{n}{2}\{9+159\} = 2604$ oe OR **M1** for $159 = 9 + d(n-1)$ oe

Question	Answer	Marks	Partial Marks
	$d = 5$	**2**	**M1FT** for $[u_{31} =]159 = 9 + 30d$ or $\frac{31}{2}\{18 + 30d\} = 2604$ **FT** *their* derived value of n OR **M1 FT** for $\frac{1}{2}\left(\frac{150+d}{d}\right)\left\{18 + \left(\frac{150+d}{d} - 1\right)d\right\} = 2604$ **FT** *their* derived expression for n in terms of d
	$r = \frac{11}{16}$ oe, isw or 0.6875	**2**	**M1FT** $[u_{12} =]9 + 11(their 5)$ or 64 and $[u_8 =]9 + 7(their 5)$ or 44 soi **FT** *their* value of d
	$\left[S_6 = \frac{64(1 - 0.6875^6)}{1 - 0.6875} =\right]$ 183 or 183.2 or 183.17[4…]	**A1**	
9(b)(i)	cos 45° = 0.707… cos 135 ° = –0.707… therefore $-1 < \cos\theta < 1$ oe OR $-1 < \cos\theta < 1$ oe → $0° < \theta < 180°$ oe	**B1**	
9(b)(ii)	$\left[\frac{a}{1-r} =\right]$ $\frac{\sin\theta}{1 - \cos\theta}$	**M1**	
	$\frac{\sin\theta}{1 - \cos\theta} \times \frac{1 + \cos\theta}{1 + \cos\theta}$	**A1**	
	$\frac{\sin\theta(1 + \cos\theta)}{1 - \cos^2\theta} = \frac{\sin\theta(1 + \cos\theta)}{\sin^2\theta}$	**A1**	
	$\frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta} = \text{cosec}\,\theta + \cot\theta$	**A1**	
10(a)	[magnitude direction =] $\sqrt{20^2 + 21^2}$ oe	**B1**	
	[velocity vector =] $\frac{58}{29}(20\mathbf{i} + 21\mathbf{j})$	**M1**	Correctly written column vectors are acceptable all through Q10
	[position vector =] $-30\mathbf{j} + t(40\mathbf{i} + 42\mathbf{j})$ or $(40t)\mathbf{i} + (-30 + 42t)\mathbf{j}$ oe	**A1**	

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