Question	Answer	Marks	Guidance
9(b)	Equates $\frac{dy}{dx} = 0$ and finds $10 - 20x = 0$ oe	**M1**	**FT** *their* (a), provided of the form $me^{-2x} + nxe^{-2x}$ or $me^{2x} + nxe^{2x}$
	$\left(\frac{1}{2}, \frac{5}{e}\right)$ oe only	**A2**	For both values: $x = 0.5$ **and** $y = 5e^{-1}$ or 1.84 or 1.839[39...] rot to 4 or more sf **A1** for $x = \frac{1}{2}$ only
9(c)	$-2xe^{-2x} - e^{-2x} + c$	**B3**	For fully correct answer or **B2** for $-2xe^{-2x} - e^{-2x}$ or $\left[\int 4xe^{-2x}dx\right] = -2xe^{-2x} + \int 2e^{-2x}dx$ or **B1** for $kxe^{-2x} = \int\left(ke^{-2x} - 2kxe^{-2x}\right)dx$ or better
9(d)	$-2e^{-2} - e^{-2} - \left(0 - e^{0}\right)$ oe	**M1**	Correct substitution of limits into correct expression
	$1 - \frac{3}{e^2}$ or $1 - 3e^{-2}$	**A1**	
10(a)	$a + (3-1)d = 10$ soi	**B1**	
	$\frac{8}{2}\{2a + (8-1)d\} = 116$ soi	**B1**	
	Correct method to eliminate one unknown and attempt to solve to find a or d	**M1**	**dep** on at least **B1** awarded
	$a = 4$ and $d = 3$	**A2**	**A1** for either
10(b)	$S_{30} = \frac{30}{2}\{2(4) + 29(3)\}$ and $S_{11} = \frac{11}{2}\{2(4) + 10(3)\}$	**B2**	**M1 FT** *their a* and *their d* for $S_{30} = \frac{30}{2}\{2(their\,4) + 29(their\,3)\}$ or $S_{11} = \frac{11}{2}\{2(their\,4) + 10(their\,3)\}$
	Correct plan $S_{30} - S_{11}$ attempted	**M1**	**FT** *their a* and *their d*
	1216	**A1**	

Question	Answer	Marks	Guidance
10(b)	**Alternative 1**		
	first term = 4 + 11×3 or 37 and an attempt at S_{19}	**(M1)**	**FT** *their a* + 11×*their d*
	$\frac{19}{2}\{2(37)+(19-1)\times 3\}$ oe or $\frac{19}{2}\{37+91\}$ oe	**(B2)**	**M1 FT** for *their* first term and *their d* in $\frac{19}{2}\{2(\textit{their}\,37)+(19-1)\times \textit{their}\,3\}$ or for *their* first term and *their* last term in $\frac{19}{2}\{\textit{their}\,37+\textit{their}\,91\}$
	1216	**(A1)**	
	Alternative 2		
	Correct sum of terms: 37 + 40 + 43 + 46 + 49 + 52 + 55 + 58 + 61 + 64 + 67 + 70 + 73 + 76 + 79 + 82 + 85 + 88 + 91	**(M3)**	**M2 FT** *their a* and *their d* for sum starting with *their* 37 **and** ending with *their* 91, with at most one omission or error or **M1 FT** *their a* and *their d* for sum starting with *their* 37 **or** ending with *their* 91, with at most two omissions or errors
	1216	**(A1)**	
11(a)	$2\mathbf{a}+\lambda(3\mathbf{b}-2\mathbf{a})$ oe isw or $3\mathbf{b}-(1-\lambda)(3\mathbf{b}-2\mathbf{a})$ oe isw	**B3**	**B1** for $\overrightarrow{PS}=3\mathbf{b}-2\mathbf{a}$ soi and **B1** for correct route using λ, either $\overrightarrow{OX}=\overrightarrow{OP}+\lambda\overrightarrow{PS}$ soi or $\overrightarrow{OX}=\overrightarrow{OS}-(1-\lambda)\overrightarrow{PS}$ soi
11(b)	$\mu(5\mathbf{a}+2\mathbf{b})$ isw	**B2**	**B1** for $\overrightarrow{OQ}=3\mathbf{b}+5\mathbf{a}-\mathbf{b}$ oe soi
11(c)	$2-2\lambda=5\mu$ and $3\lambda=2\mu$ oe	**M2**	for correctly equating scalars for both components **FT** *their* **(a)** and **(b)** if possible **M1 FT** for equating scalars for either component
	Solves to find $\lambda=\frac{4}{19}$ or $\mu=\frac{6}{19}$	**A1**	
	$\lambda=\frac{4}{19}$ and $\mu=\frac{6}{19}$	**A1**	
11(d)	$\frac{6}{19}$ isw	**B1**	
11(e)	$\frac{4}{15}$ isw	**B1**	