Question Number	Scheme	Marks
4(a)	Common Spotted-orchids occur singly/randomly/independently	B1
		(1)
(b)(i)	$S \sim \text{Po}(4.5)$	
	$\text{P}(S=6)=\frac{\text{e}^{-4.5}4.5^6}{6!}$ or $\text{P}(S\leq 6)-\text{P}(S\leq 5)$	M1
	$=0.1281\ldots$ awrt 0.128	A1
(ii)	$\text{P}(4<S<10)=\text{P}(S\leq 9)-\text{P}(S\leq 4)$ or $0.9829-0.5321$	M1
	$=0.4508$ awrt 0.451	A1
		(4)
(c)	$\text{H}_0: \lambda=9$ $\text{H}_1: \lambda>9$	B1
	$M \sim \text{Po}(9)$ $\text{P}(M\geq 11)=1-\text{P}(M\leq 10)$ or $\text{P}(M\geq 15)=0.0415$	M1
	$=0.294$ or CR $M\geq 15$	A1
	Accept H_0 or insignificant or 11 does not lie in the critical region	dM1
	There is insufficient evidence to support **Juan's belief**	A1
		(5)
(d)	$T \sim \text{N}(90, 90)$	B1
	$\text{P}(T<70)=\text{P}\left(Z<\pm\left(\frac{69.5-90}{\sqrt{90}}\right)\right)$ or $\text{P}(Z<\pm 2.160\ldots\ldots)$ awrt 2.16	M1
	$=0.0154$ awrt 0.0154	A1
		(3)
(e)	$V\sim \text{Po}(200\times 0.012)=\text{Po}(2.4)$ $V\sim=\text{Po}(2.4)$	M1
	$\text{P}(V=0)+\text{P}(V=1)=\text{e}^{-2.4}(1+2.4)$	dM1
	$=0.30844\ldots$ awrt 0.308	A1
		(3)
	Notes	**Total 16**
4(a)	**B1**	One of the given reasons. No context needed
(b)(i)	**M1**	For $\frac{\text{e}^{-\lambda}\lambda^6}{6!}$ with any value for λ or writing or using $\text{P}(S\leq 6)-\text{P}(S\leq 5)$
	A1	awrt 0.128
(ii)	**M1**	Writing or using $\text{P}(S\leq 9)-\text{P}(S\leq 4)$
	A1	awrt 0.451
(c)	**B1**	Both hypotheses correct. Must be attached to H_0 and H_1 in terms of λ or μ. Allow 4.5 instead of 9.
	M1	Writing or using Po(9) and $1-\text{P}(M\leq 10)$ or $\text{P}(M\geq 15)=0.0415$ oe Implied by correct CR or awrt 0.3 or 0.29… or better (0.2940…)
	A1	0.3 or 0.29… or better (0.2940…) or $M\geq 15$ oe SC: Condone $\text{P}(X\leqslant 10)=0.7$ or better (0.705988....) for M1A1
	dM1	Dep on M1 A1. A correct statement– no context needed but do not allow contradicting non contextual comments. Allow opposite conclusion if 2-tail hypotheses given.
	A1	Correct conclusion. If H_0 is 2- tail the opposite conclusion must be given. No hypotheses or H_0 $\lambda<9$ gets A0. Allow claim instead of belief. Alternative: There is insufficient evidence to support hat the number of Common Spotted-**orchids** has **increased/ /is not 9/has changed oe** (with the bold words included).
(d)	**B1**	Writing or using N(90, 90)
	M1	Standardising with 68.5 or 69.5 or 70.5 and their mean and sd
	A1	awrt 0.0154 **NB** Poisson gives 0.01275…
(e)	**M1**	Writing or using $\text{Po}(200\times 0.012)$ Allow $\text{Po}(200\times$"their d")
	dM1	Dependent on using Poison. For using / writing $\text{P}(V=0)+\text{P}(V=1)$ or $\text{e}^{-\lambda}(1+\lambda)$ or $\text{P}(V\leqslant 1)$ oe
	A1	awrt 0.308 **NB** Binomial gives 0.3066