Question Number	Scheme	Marks
5(a)	No of meteors in 20 mins, $M \sim \text{Po}(5)$ oe	B1
(i)	$\text{P}(M \geqslant 6) = 1 - \text{P}(M \leqslant 5)$	
	$= 1 - 0.6160 = 0.3840$	M1
	awrt 0.384	A1
(ii)	$\text{P}(M \leqslant 3)$	
	$= 0.2650$	
	awrt 0.265	A1
		(4)
(b)	$\text{H}_0 : \lambda = 15 \qquad \text{H}_1 : \lambda > 15$	B1
		(1)
(c)	For 30 mins use $X \sim \text{Po}(7.5) \qquad \text{P}(X \leqslant 12) = 0.9573$	M1
	Correct probability statement: $\text{P}(X \geqslant 13) = 0.0427$	A1
	Critical Region $X \geqslant 13$	B1
		(3)
(d)	Test statistic $x = 12$ is not in critical region oe (so insufficient evidence to reject H_0 / insignificant result)	M1
	No significant evidence that the number of **meteors** to be seen has **increased**/no significant evidence to support the **astronomy club's claim**	A1
		(2)
		Total 10

(a)	**B1**	Po(5) seen, used or implied by correct answer in (i) or (ii). Sight (to 3sf) of any of 0.265(0) (or 0.765(0), 0.4405 (or 0.5595), 0.616(0) (or 0.384(0)), 0.7622 (or 0.2378) implies this mark.
(i)	**M1**	For an attempt at calculating $1 - \text{P}(M \leqslant 5)$ with a Poisson distribution. Imp. by correct answer
	A1	awrt 0.384 (condone $\frac{48}{125}$)
(ii)	**A1**	awrt 0.265 (independent of the M mark in (i) so B1M0A0A1 is possible)
(b)	**B1**	written in terms of λ or μ only (accept 7.5 instead of 15 if consistently used for both)
(c)	**M1**	evidence of $\text{Po}(7.5)$ stated or used. Sight of any of 0.0203 or 0.9208 (or 0.0792), 0.9573 (or 0.0427), 0.9784 (or 0.0216), 0.9897 (or 0.0103) to 2sf with probability statement or 3sf on their own implies this mark.
	A1	correct probability statement $\text{P}(X \geqslant 13)$ oe and awrt 0.0427 oe (awrt 4.27%).
	B1	correct critical region $X \geqslant 13$ (or $X > 12$) **only**, with or without probability given and independent of their (b). Allow a different letter for X but do not allow CR.
(d)	**M1**	For a correct comparison ft their CR $X \ldots a$ oe (may be written as $\text{P}(X \ldots a)$) where $a \geqslant 13$ indicating 12 is not in the critical region. e.g. $12 < \text{"13"}$ so accept H_0 Alternatively compares e.g. $\text{P}(X \leqslant 12) = 0.0792 (> 0.05)$ or $\text{P}(X \leqslant 11) = 0.9208 < 0.95$ and indicates do not reject H_0. Do not ignore contradictory non-contextual statements. Allow if they have a 2-tail CR provided upper CR is $\text{P}(X \ldots a)$ oe where $a \geqslant 13$
	A1	Correct conclusion indep. of hypotheses and must be in context. Must mention **meteors** and **increase** OR the **club's claim** oe e.g. insufficient evidence to suggest the number of meteors is greater. Condone e.g. there are not more meteors / the number of meteors has not changed.