Question Number		Scheme	Marks
2.	(a)	[X = number of faults in 4 m^2 so $X \sim$ Po(3)]	
		$P(X=5) = P(X \leqslant 5) - P(X \leqslant 4)$ [= 0.9161 – 0.8153] or $\frac{e^{-3}3^5}{5!}$ (allow λ instead of 3)	M1
		= 0.1008 or 0.100818… awrt **0.101**	A1
			(2)
	(b)	[Y = number of faults in 6 m^2 so] $Y \sim$Po(4.5) and $\left[P(Y>5)\right] = 1 - P(Y \leqslant 5)$ [= 1 – 0.7029]	M1
		= 0.2971 or (calc) 0.29706956… awrt **0.297**	A1
			(2)
	(c)	**0.101** (or ft their answer to (a))	B1ft
		Faults occur **independently/ randomly**	B1
			(2)
	(d)	[F = number of faults in a small rug] $F \sim$ Po(0.9)	B1
		$e^{-"0.9"}n \times 80 + \left(1 - e^{-"0.9"}\right)n \times 60 \geqslant 4000$ or $(\text{awrt } 0.407)n \times 80 + (\text{awrt } 0.593)n \times 60 \geqslant 4000$	M1
		$n \geqslant \frac{4000}{20e^{-"0.9"} + 60} = 58.71\ldots$	M1
		$n =$ **59**	A1
			(4)
	(e)	$H_0 : \lambda = 9$ $H_1 : \lambda > 9$	B1
		$R \sim$ Po("0.9"×10) and [P($R \geqslant 13$)] = 1 – P($R \leqslant 12$) [= 1 – 0.8758]	
		P($R \leqslant 13$) = 0.9261 or P($R \geqslant 14$) = 0.0739 or P($R \leqslant 14$) = 0.9585 or P($R \geqslant 15$) = 0.0415	M1
		[P($R \geqslant 13$)] = 0.1242 awrt 0.124 or CR $R \geqslant 15$ (oe)	A1
		so insufficient evidence to reject H_0 /not significant/ not in critical region	M1
		There is insufficient evidence that the **rate** at which **faults** occur is higher for **Rhiannon**	A1
			(5)
			Total 15

	Notes
(a)	**M1:** for using or writing $P(X \leqslant 5) - P(X \leqslant 4)$ or $\frac{e^{-\lambda}\lambda^5}{5!}$ (Accept letter λ or any value of λ)
(b)	**M1:** writing or using Po(4.5) and sight of $\left[P(Y>5)\right] = 1 - P(Y \leqslant 5)$ Implied by sight of 1 – 0.7029
(c)	**2nd B1:** for a comment about faults occurring **randomly/independently** or Poisson has "**no memory**"
(d)	**B1:** writing or using Po(0.9) May be implied by sight of 0.407 or 0.593 **1st M1:** for $e^{-\lambda}n \times 80 + \left(1 - e^{-\lambda}\right)n \times 60 > 4000$ any value for λ. Allow = 4000 **2nd M1:** for solving their equation leading to a positive value of n. Allow any value of λ and allow n = … **A1:** for an answer of 59 only
(e)	**B1:** both hypotheses correct with λ or μ. Allow 3 or 0.75 or 0.9 instead of 9 **1st M1:** for writing or using Po("9") and writing or using 1 – P($R \leqslant 12$) (implied by 1 – 0.8758) or one of: P($R \leqslant 13$) = 0.9261, P($R \geqslant 14$) = 0.0739, P($R \leqslant 14$) = 0.9585, P($R \geqslant 15$) = 0.0415 **leading to a CR** **1st A1:** for probability = awrt 0.124 or CR of $R \geqslant 15$ oe e.g. $R > 14$ **2nd M1:** for a correct conclusion based on their prob & 0.05 or their CR & 13. Assume correct hypotheses. Do not allow contradicting conclusions **2nd A1:** dep on both Ms for a correct contextual comment including the words in bold.