Question Number	Scheme	Marks
3 (a)	We can assume breakdowns are [rare], independent events occurring at a constant rate.	B1
		(1)
(b)	$H_0 : \lambda = 8$ $H_1 : \lambda \neq 8$	B1
		(1)
(c)	$X \sim \text{Po}(8)$	
	$P(X \leqslant 2) = 0.0138$ oe $P(X \leqslant 3) = 0.0424$ oe	M1
	$P(X \geqslant 14) = 0.0342$ oe $P(X \geqslant 15) = 0.0173$ oe	M1
	$X \leqslant 2 \cup X \geqslant 15$ oe	A1
		(3)
(d)	"0.0138" + "0.0173"	M1
	="0.0311"	A1ft
		(2)
(e)	"[4 is] not in the critical region"	M1
	So there is insufficient evidence that refurbishment has changed the mean breakdown rate	A1
		(2)

	Notes	Total 9
3 (a)	**B1**	A correct statement which include the words independent or constant rate or singly. No context needed
(b)	**B1**	Both hypotheses correct. Must be attached to H_0 and H_1 in terms of λ or μ.
(c)	**M1**	Use of $\text{Po}(8)$ to find the lower critical value. May be implied by either 0.0138 or 0.0424 or $X \leqslant 2$ if no probabilities shown (Calculator values: 0.01375… and 0.04238…)
	M1	Use of $\text{Po}(8)$ to find the upper critical value. May be implied by 0.0342 or 0.0173 or 0.9658 or 0.9827 or $X \geqslant 15$ if no probabilities shown (Calculator values: 0.03418… and 0.01725… and 0.96581… and 0.98274…)
	A1	$X \leqslant 2$ oe [$\cup$] $X \geqslant 15$ oe Condone the use of and/or Do not allow as probability statements Allow [0, 2] or [0, 3) and [15, ∞] or [15, ∞) or (14, ∞] or (14, ∞)
(d)	**M1**	Adding the two probabilities for their critical region
	A1ft	0.0311 Allow 3.11 or awrt 3.1[0] or awrt 0.031[0] ft their critical region
		NB 3.11 or 0.0311 or awrt 3.1[0] or awrt 0.031[0] will score 2/2
(e)	**M1**	A correct statement ft their critical region e.g. Do not reject H_0/Accept H_0/not significant – no context needed but do not allow contradicting non contextual comments
	A1	Correct conclusion in context. Must include rate/number of breakdown (Allow decreased for changed)
		NB Award M1 A1 for a correct contextual statement on its own