Question Number	Scheme	Marks
7. (a)	$R \sim \text{Po}(8)$ $\text{P}(4 \leqslant R \leqslant 8) = \text{P}(R \leqslant 8) - \text{P}(R \leqslant 3) = 0.5925 - 0.0424$ $= 0.5501$ = awrt **<u>0.550</u>**	B1 M1 A1 (3)
(b)	$H \sim \text{Po}(4)$ $\text{P}(H \leqslant 2) = 0.2381$ $Y \sim \text{B}(5, \text{“0.2381”})$ $\text{P}(Y = 2) = {}^5\text{C}_2(\text{"0.2381"})^2(1-\text{"0.2381"})^3$ $= 0.25073\ldots$ = awrt **<u>0.251</u>**	B1 B1 M1 M1 A1 (5)
(c)	W = number sold in first fifteen minutes X = number sold in last forty five minutes $\text{P}(W > X \mid R = 4) = \dfrac{\text{P}(W=4)\text{P}(X=0) + \text{P}(W=3)\text{P}(X=1)}{\text{P}(R=4)}$ $= \dfrac{\frac{\text{e}^{-2}2^4}{4!}\frac{\text{e}^{-6}6^0}{0!} + \frac{\text{e}^{-2}2^3}{3!}\frac{\text{e}^{-6}6^1}{1!}}{\frac{\text{e}^{-8}8^4}{4!}}$ $= \dfrac{13}{256}$ (awrt 0.0508 or awrt 0.0509) F = number of muffins sold in first 15 minutes $F \sim \text{B}(4, 0.25)$ $\text{P}(F > 2) =$ $\text{P}(F = 3) + \text{P}(F = 4)$ $= {}^4\text{C}_3(0.25)^3(0.75) + 0.25^4$	M1 M1 M1 A1 (4) **[Total 12]**
	Notes	
(a)	B1 writing or using Po(8) (may be implied by one correct probability from 0.5925, 0.0424 0.4530 or 0.0996) M1 writing or using $\text{P}(R \leqslant 8) - \text{P}(R \leqslant 3)$ A1 awrt 0.550 (calc: 0.55016….) correct answer scores 3 out of 3	
(b)	1st B1 writing or using Po(4) 2nd B1 awrt 0.238 1st M1 choosing binomial distribution with n = 5 and their p 2nd M1 ${}^5\text{C}_2\, p^2(1-p)^3$ with $0 < p < 1$ A1 awrt 0.251	
(c)	1st M1 attempt at either correct product $\text{P}(W=4)\text{P}(X=0)$ or $\text{P}(W=3)\text{P}(X=1)$ from $W \sim \text{Po}(2)$ and $X \sim \text{Po}(6)$ implied by awrt 0.0902×awrt 0.0025 or awrt 0.180×awrt 0.0149 or awrt 0.0029 2nd M1 conditional probability with $\text{P}(R = 4)$ from $R \sim \text{Po}(8)$ on denominator implied by awrt 0.0573 seen in the denominator of a probability expression 3rd M1 complete expression for the required probability implied (awrt 0.0902×awrt 0.0025+awrt 0.180×awrt 0.0149)/awrt 0.0573 for 3rd M1 A1 allow awrt 0.0508 or awrt 0.0509 from use of tables	
ALT	1st M1 identifying B(4, 0.25) 2nd M1 $\text{P}(F = 3) + \text{P}(F = 4)$ from B(4, 0.25) 3rd M1 $4p^3q + p^4$ from B(4, 0.25)	

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