Question	Scheme	Marks
5. (a)	X~Po(7.5)	B1
(i)	P(X = 10) [= 0.8622 – 0.7764 = $\frac{e^{-7.5}(7.5)^{10}}{10!}$] = 0.0858… awrt **<u>0.0858</u>**	B1
(ii)	P(6 „ X „ 11) = P(X „ 11) – P(X „ 5) [=0.9208 – 0.2414]	M1
	= 0.6794 awrt **<u>0.679</u>**	A1
		(4)
(b)	Y = number of samples that contain 0 particles	
	Y ~B(12, p) or B(12, $e^{-0.15m}$) or B(12, $e^{-\lambda}$)	M1
	[P(Y … 2) =] 1 – P(Y „ 1) = 0.1184	M1
	P(Y „ 1) = 0.8816 → from tables [p =] 0.05	A1
	S = number of particles per m millilitres	
	S ~ Po(0.15m)	M1
	P(S = 0) =0.05 or $e^{-0.15m}$ = "0.05"	M1
	–0.15m = ln(0.05) → m =19.9715… awrt **<u>20.0</u>**	A1
		(6)
		[10 marks]

	Notes
(a)	1st B1 writing or using Po(7.5) May be implied by a correct probability
(i)	2nd B1 awrt 0.0858 [calc = 0.0858303…]
(ii)	M1 writing or using P(X „ 11) – P(X „ 5)
	A1 awrt 0.0679 [calc = 0.06793222…]
(b)	1st M1 writing or using B(12, p) Allow Binomial with n = 12 or B(12,…) May be implied by 0.05
	2nd M1 for 1 – P(Y „ 1) = 0.1184 (or better) or P(Y „ 1) = 0.8816 oe eg $(1-p)^{12} + 12p(1-p)^{11} = 0.8816$ Implied by 0.05
	1st A1 0.05(seen)
	3rd M1 writing or using Po(0.15m) May be implied by $e^{-0.15m}$
	4th M1 ft their p ($0 < p < 1$) for an equation of the form $e^{-0.15m}$ = "0.05" (allow $e^{-\lambda}$ = "0.05") Allow 0.15m = 3
	2nd A1 Allow 20 or awrt 20.0 Allow trial and error to solve their equation