Assessment Schedule – 2005

Statistics and Modelling: Use probability distribution models to solve straightforward problems (90646)

Evidence Statement

	Achievement Criteria	Q	Evidence	Code	Judgement	Sufficiency
Achievement	Use probability distribution models to solve straightforward problems.	1	Poisson distribution P $(x \le 2; \lambda = 1.5)$ = 0.8088 (GC: 0.80884)	A	CAO Or equivalent.	**Achievement:** 2 × code A. No repeated distributions.
		2	Binomial distribution P $(x = 2; n = 12, \pi = 0.18)$ = 0.2939 (GC: 0.29391)	A	CAO Or equivalent.	
		3(a)	Normal distribution P $(X < 160)$ = P $(Z < 0.565)$ = 0.5 + 0.2140 = 0.714 (GC: 0.71403)	A	CAO Or equivalent.	
Achievement with Merit	Use probability distribution models to solve problems.	3(b)	Normal distribution P$(X < a) = 0.05$ $Z = -1.645$ $a = 109.2$ g (GC: 109.16)	A M	No units needed. CAO Or equivalent. Allow 109 or 110.	**Achievement with Merit:** **EITHER** As for Achievement **plus** 2 × code M **OR** 3 × code M.
		3(c)	Normal distribution E$(T) = 50 \times 147 = 7350$ $\sigma(T) = \sqrt{50 \times 23^2}$ = 162.63 P $(T > 7500)$ = P $(z > 0.922)$ = 0.1783 (GC: 0.17818)	A M	CAO Or equivalent.	
		4	Poisson distribution P (No plants on one day) = P $(X = 0; \lambda = 5)$ = 0.0067 P (No plants both days) = 0.0067^2 = 0.00004489 (GC: 4.54×10^{-5})	A M	If use A, lose M. CAO Or equivalent.	

	Achievement Criteria	Q	Evidence	Code	Judgement	Sufficiency
Achievement with Excellence	Use and justify probability distribution models to solve complex problems.	5(a)	Binomial because: • Two possible outcomes – misinterpreted or not • Fixed number of trials $n = 200$ • Probability remains constant $\pi = 0.018$ • Trials assumed independent.	A M	Must state distribution. Need both parameters – parameters can be inferred from 5(b) or 5(c). Need 3 out of 4 conditions listed with qualifying details from problem. Or equivalent.	**Achievement with Excellence:** As for Merit **plus** $3 \times$ code E.
		5(b)	Poisson approximation. Condition: π is small Parameter, $\lambda = 3.6$	E	Distribution stated. Condition needed. Parameter calculated – parameter can be inferred from 5(c).	
		5(c)	Poisson approximation $P(X \le 3; \lambda = 3.6)$ $= 0.515$ (GC: 0.51521) **OR** Binomial distribution $P(X \le 3; n = 200, \pi = 0.018)$ $= 0.514$ (GC: 0.51405)	AME	Or equivalent.	

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
Use probability distribution models to solve straightforward problems. $2 \times A$ No repeated distributions	Use probability distribution models to solve problems. **Achievement** *plus* $2 \times M$ *or* $3 \times M$	Use and justify probability distribution models to solve complex problems. **Merit** *plus* $3 \times E$