

Accept percentages throughout this question

Q	Marking Instructions	AO	Marks	Typical Solution
19	States both hypotheses correctly for one-tailed test accept 'population proportion' = 0.7 or 70%, but NOT $x =$ or $\bar{x} =$ or $\mu =$	AO2.5	B1	$X =$ number of seeds which germinate $H_0: p=0.7$ $H_1: p>0.7$
	States model used PI can also be implied by 0.0278 or 0.00684	AO3.3	M1	Under null hypothesis $X \sim B(20, 0.7)$ $P(X \geq 18) = 1 - P(X \leq 17)$ $= 1 - 0.965$ $= 0.035$ $0.035 < 0.05$ Reject H_0 There is sufficient evidence to conclude that the new seeds are more likely to germinate.
	Calculates $P(X \geq 18)$ or $P(X \geq 19)$, (PI by 0.035(5) or 0.0076) but not $P(X = 18)$ or $P(X = 19)$	AO1.1a	M1	
	Obtains correct probability for $P(X \geq 18)$	AO1.1b	A1	
	Evaluates binomial model by comparing 0.035(5) or 0.0076 with 0.05 but not $P(X = 18)$ or $P(X = 19)$	AO3.5a	M1	
	Infers H_0 rejected (FT 0.0076), condone 'accept H_1 '	AO2.2b	A1F	
	Concludes correctly in context. 'Sufficient evidence' or equivalent required. Only award for full complete correct solution.	AO3.2a	R1	
Total			7	

Q	Alternative Marking Instructions	AO	Marks	Typical Solution
19	States both hypotheses correctly for one-tailed test accept 'population proportion' = 0.7 or 70%, but NOT $x =$ or $\bar{x} =$ or $\mu =$	AO2.5	B1	$X =$ number of seeds which germinate $H_0: p=0.7$ $H_1: p>0.7$
	States model used PI can also be implied by 0.0716 or 0.0278	AO3.3	M1	Under null hypothesis $X \sim B(20, 0.7)$ $P(X \geq 17) = 0.1071 > 0.05$ and $P(X \geq 18) = 0.0355 < 0.05$ Hence $X \geq 18$ is critical region $X = 18$ is in critical region Reject H_0 There is sufficient evidence to conclude that the new seeds are more likely to germinate.
	Finds $P(X \geq 17)$ and $P(X \geq 18)$ but not $P(X = 17)$ or $P(X = 18)$ accept 0.035	AO1.1a	M1	
	Identifies correct critical region	AO1.1b	A1	
	Evaluates Binomial model by comparing $X = 18$ with critical region (condone CR of $X \geq 17$)	AO3.5a	M1	
	Infers H_0 rejected, condone 'accept H_1 ' FT CR of $X \geq 17$	AO2.2b	A1F	
	Concludes correctly in context. 'Sufficient evidence' or equivalent required. Only award for full complete correct solution.	AO3.2a	R1	
Total			7	