

Question		Scheme	Marks	AOs
2(a)		$H_0 : p = 0.4 \quad H_1 : p \neq 0.4$	B1	2.5
		$[X \sim] B(60, 0.4)$	M1	3.3
		$P(X \geq 31) = 1 - P(X \leq 30) (= 1 - 0.9555\dots)$ $= 0.0444803\dots$ awrt 0.0445	A1	3.4
		["0.0445" > 0.025, therefore not significant, so...] Do not reject H_0 . Not enough evidence to suggest that training with the new psychologist has <u>changed</u> the <u>proportion</u> of her <u>free throws</u> from which she <u>scores</u> .	A1	2.2b
			(4)	
(b)		p -value is $2 \times "0.0444803" = 0.08896\dots$ awrt 0.089	B1ft	1.1b
			(1)	
(Total 5 marks)				
Notes:				
(a)	B1	For correctly stating the hypotheses in terms of p or π .		
	M1	For sight of the correct model $B(60, 0.4)$. May be implied by a correct final answer or a correct probability value: awrt 0.956 or 0.0445		
	A1	awrt 0.0445 (allow awrt 0.044 if correct model seen). Allow CR $X \geq 33$ [and $X \leq 16$]		
	A1	Correct conclusion. Can be awarded even if the candidate has not scored the B1, however, their conclusion cannot contradict their hypotheses i.e if they've stated a 1-tail test, then H_0 must be rejected.		
(b)	B1ft	Multiplying their answer in (a) by 2 as long as p -value ≤ 0.5		